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IMPLEMENTATION OF ENVIRONMENTAL TREATIES

JOINT HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

AND

COMMITTEE ON FOREIGN RELATIONS UNITED STATES SENATE

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

ON

JULY 24, 2002

Printed for the use of the Committee on Environment and Public Works and the Committee on Foreign Relations

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IMPLEMENTATION OF ENVIRONMENTAL TREATIES

WEDNESDAY, JULY 24, 2002

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
COMMITTEE ON FOREIGN RELATIONS,
Washington, DC.

The committees met, pursuant to notice, at 10:35 a.m. in room 406, Senate Dirksen Building, Hon. James M. Jeffords [chairman of the Committee on Environment and Public Works], presiding.

Present from the Committee on Environment and Public Works:: Senators Jeffords, Chafee, and Corzine.

Present from the Committee on Foreign Relations: Senators Sarbanes and Feingold.

OPENING STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

Senator JEFFORDS. This hearing will come to order.

I am glad to be here with my distinguished co-chair from the Foreign Relations Committee, Senator Sarbanes, for this joint hearing. I appreciate his willingness to explore today's topic and the fact that he has joined me as a cosponsor of S. 556, the Clean Power Act. I would also like to applaud him for his work to bring some truth and sanity to America's accounting nightmare. Good luck.

The United States is an economic and military superpower, perhaps the lone superpower. But as the old adage goes, with great power comes great responsibility. We are able to project great might far beyond our borders. We are also capable of contributing to environmental and natural resource damage far beyond our borders and far in excess of other countries.

The question is, are we acting responsibly to curb negative impacts abroad and at home?

Are we being good global neighbors and, at a minimum, keeping our word?

It seems that we may be keeping our literal word, given the very broad language in many of the agreements, but, in practical terms, it seems that we are not trying very hard to keep up with the spirit of some of our commitments.

The time is ripe for Congress to review how the Administration is implementing our environmental agreements and commitments. Leaders of many countries will be meeting in Johannesburg, South Africa, in late August at the World Summit on Sustainable Development. The occasion is the tenth anniversary of the United Na-

tions Conference on Environmental Development held in Rio. I am pleased to note that the Secretary General of that conference, Mr. Maurice Strong, is here today to give us an historical perspective on the event and its lasting effect.

The conferees will be met by a very different U.S. delegation in South Africa. The previous Bush Administration provided extensive support to the Rio Earth Summit and brought many new initiatives to the negotiating table. But this Administration is likely to send a smaller and lower level delegation and has sought to narrow the scope of its discussions. This has apparently included an effort to keep the global climate change off the agenda.

I am troubled by the Administration's approach to global warming, especially in light of the Sense of Congress approved by the Foreign Relations Committee and made part of the Senate-approved Energy Bill in April. That resolution says the United States should take responsible action to ensure significant and meaningful reductions in emissions of greenhouse gases from all sectors. But it does not appear that responsible action is taking place and emissions continue to grow.

As my friend Senator Chafee pointed out during our committee's markup on the Clean Power Act, the Administration's Climate Action Report says, "A few ecosystems such as alpine meadows in the Rocky Mountains and some Barrier Islands are likely to disappear entirely in some areas. Other ecosystems are likely to experience major species shifts."

Our treaty commitment says, "The ultimate objective of the Framework Convention on Climate Change is to stabilize greenhouse gas concentrations in the atmosphere at the level that will prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change." Since these ecosystems are likely to disappear entirely because of the man-made global warming and will not able to adapt naturally, it appears that we have entered into a zone of "dangerous interference."

Since these are real threats of serious or irreversible damage, the lack of full scientific certainty about cause and effect should not be used as an excuse for not reducing emissions now. That is our commitment. Instead of acting to reduce emissions, the Administration's approach guarantees that greenhouse gas emissions will rise. According to Mr. Connaughton's recent testimony, there is no question about that.

This kind of inaction does not compact with our commitments under the Framework Convention and the Sense of Congress, common sense, or the National Environmental Policy Act, NEPA. In 1969, NEPA became law. It was probably the first adoption of a sustainable development philosophy by a government in the world. To paraphrase it, it says, "It is the continuing policy of the Federal Government to use all practicable means and measures to create and maintain conditions under which man and nature can exist in productive harmony and fulfill the social, economic, and other requirements of present and future generations of Americans."

Unfortunately, the Administration seems to have lost sight of these future generations of Americans. Economic development that

does not factor in the environment of quality of life of those future generations is not sustainable. The Administration and other opponents of the Kyoto Protocol claim that the actions that significantly reduce greenhouse gas emissions cost too much now. They need to look at the long term. They also need to look at the many studies that have been done that show a net positive impact of reducing emissions.

I ask unanimous consent that the two studies by Tellus Institute and a list of other studies be placed in the record.

[The referenced documents follow:]

[World Wildlife Fund, October 2001]

CLEAN ENERGY: JOBS FOR AMERICA'S FUTURE

A STUDY FOR WORLD WILDLIFE FUND

(By Alison Bailie, Stephen Bernow, William Dougherty, Michael Lazarus, Sivan Kartha, Tellus Institute and Marshall Goldberg, MRG & Associates)

Acknowledgments

We wish to thank Katherine Silverthorne, Kathleen Sullivan, Brooks Yeager and Freda Colbert of WWF for their assistance on this report. We thank Hal Harvey, Marcus Schneider and Eric Heitz of Energy Foundation for their help in supporting our modeling capabilities. The energy efficiency analyses and inputs to our modeling effort for buildings, industry and light duty vehicles were provided by ACEEE (Steve Nadel, Howard Geller, Neal Elliott and Therese Langer) and John DeDicco of Environmental Defense. Modifications to the NEMS model, particularly as related to renewables in the electricity sector, were made at Tellus with important input from Alan Nogee, Deborah Donovan and Steve Clemmer of Union of Concerned Scientists; Laura Martin, Tom Petersik, Alan Beamon, Zia Haq, and Jeff Jones of EIA; and other experts including Walter Short of NREL, Jack Cadogan of ORNL, Dan Entingh of Princeton Economic Research, Inc., Etan Gummerman, Lawrence Berkeley Labs, Francis Wood of OnLocation, Inc., and Michael Brower. We also wish to thank Francisco de la Chesnaye and Reid Harvey of USEPA, who provided important data on non-CO_2 gases, and Kevin Gurney, who provided useful insights on land-based carbon. We also thank Skip Laitner for his ongoing input and insight.

About the Tellus Institute

Founded in 1976 as a nonprofit research and policy organization, Tellus addresses a broad range of environment and resource issues. The Institute's staff of 50 scientists and policy analysts is active throughout North America and the world. Internationally, Tellus works closely with the Stockholm Environment Institute, hosting SEI's Boston Center since 1989. The transition to a sustainable world must occur at many levels. Tellus contributes to this goal through its work on global scenarios, regional and national strategies, community sustainability and industrial ecology. Projects focus on such areas as energy, water, waste, transportation, and integrated sustainability planning. This institutes diverse sponsors—foundations, governments, multilateral organizations, nongovernmental organizations and business—reflect this varied program.

EXECUTIVE SUMMARY

Over the past three decades national energy policy has been the subject of intense debate and policy innovation. Americans were buffeted by oil embargoes and price increases in the 1970's, enjoyed low energy prices in the 1980's, and today face the consequences of electricity deregulation, energy supplier market power and regional price spikes. To meet these challenges the public and policymakers have called for the expansion of policies to ensure that energy services remain readily available and affordable, while protecting public health and the environment. These policies, which helped to produce the low energy prices of the 1990's, include appliance efficiency standards, energy-saving building codes, vehicle fuel efficiency and tailpipe emissions standards, clean air legislation, and caps on pollution from power plants. Over the 30-year period during which these policies have been in effect, the United States has reduced its energy per unit Gross Domestic Product by about one-third, even though the economy grew by 160 percent.

In order to create a responsible, forward-looking energy policy, the United States will need to examine a number of important issues. Will the policy help meet America's energy needs? Will it enhance national security? Will it contribute to a strong economy? Will it help meet America's needs for a safe and healthy environment? In order to begin to answer these questions, World Wildlife Fund commissioned the Tellus Institute to consider the potential impacts of implementing a broad suite of clean energy policies over the next 20 years.

Our national choices regarding the production and use of energy have serious implications for our environment. At every step of the process, from extraction, to refining, to transport and combustion, fossil fuels have negative impacts on land and water-based ecosystems. In addition to these well-known effects, it is now clear that overreliance on fossil fuels is a major cause of climate change. Because we consider climate change one of the greatest global threats to biodiversity, we chose to consider a suite of policies that would address our energy needs while reducing our dependence on fossil fuels and decreasing emissions of greenhouse gases. We call this suite of policies the Climate Protection Scenario.

This study analyzes the employment, macroeconomic, energy and environmental impacts of implementing the Climate Protection Scenario. These policies were compared with a base case based on Energy Information Administration's Annual Energy Outlook (EIA, 2001).

Climate Protection Scenario

Buildings and Industry Sector
- Building Codes
- Appliance and Equipment Standards
- Tax Credits
- Public Benefits Fund
- Research and Development
- Voluntary Measures
- Cogeneration for Industrial and District Energy

Electric Sector
- Renewable Portfolio Standard
- NOx/SO_2 Cap and Trade
- Carbon Cap and Trade

Transport Sector
- Automobile Efficiency Standard Improvements
- Promotion of Efficiency Improvements in Freight Trucks
- Aircraft Efficiency Improvements
- Greenhouse Gas Standards for Motor Fuels
- Travel Demand Reductions and High Speed Rail

Implementing these policies would help address many of our most pressing concerns about energy supply, the economy, employment, energy security, and the environment. We found that they would lead to net increases in employment over the next 20 years. They would reduce our dependence on oil and other fossil fuels, thereby greatly increasing our energy security. Household energy bills would decrease despite a small increase in the price of electricity. And, we could mitigate climate change and other air pollution problems. A more detailed description of the benefits can be found in the findings section below.

The benefits of implementing the Climate Protection Scenario would be spread widely across all States and all sectors of the economy—including construction, transportation, motor vehicles, manufacturing, services, retail trade and agriculture. However, some industries within the energy sector would not share in the economic benefits from this transition, as the economy's reliance on carbon-intensive fossil fuels would decline. This suggests that while there would be widespread gains to workers throughout the economy, it would be necessary to provide assistance and support in order to ensure a just transition for workers who would otherwise be displaced during the beginning of this transition.

FINDINGS

If Congress were to implement the policies outlined in WWF's Climate Protection Scenario, the United States could reap the following benefits:

- A net annual employment increase of over 700,000 jobs in 2010, rising to approximately 1.3 million by 2020;
- An 8.5 percent decline in carbon emissions between 2000 and 2010, as opposed to the approximately 20 percent increase projected in the base case, and a 28 percent decline between 2000 and 2020 rather than a 36 percent increase;

- Twenty percent of the electricity generation needed in 2020 would come from wind, solar, biomass and geothermal energy;
- Oil consumption would decline by approximately 8 percent between 2000 and 2020, rather than increase by about 31 percent, thereby saving money and reducing the vulnerability of citizens and our economy to oil price shocks;
- Overall dependence on the consumption of fossil fuels would decline more than 15 percent between 2000 and 2020, rather than increasing by 40 percent as in the base case;
- Households and businesses would accumulate savings of over $600 billion by 2020;
- GDP would be about $43.9 billion above the base case in 2020;
- Energy-related emissions of air pollution would be dramatically reduced—by 2020, emissions of sulfur dioxide would be virtually eliminated, while nitrogen oxide emissions would be almost halved, and emissions of fine particulates, carbon monoxide, volatile organic compounds and mercury would be substantially reduced;
- An additional $51.4 billion in wage and salary compensation by 2020 relative to the base case;
- Each State would experience a positive net job impact, rising to about 140,000 in California by 2020; and
- Electricity sales from central station power stations would be about half of projections for 2020, owing to the policy of promotion of more efficient equipment in homes and offices and the use of waste heat in combined heat and power plants in buildings and factories.

INTRODUCTION

Over the past three decades national energy policy has been the subject of intense debate and policy innovation. Americans were buffeted by oil embargoes and price increases in the 1970's, enjoyed low energy prices in the 1980's, and today face the consequences of electricity deregulation, energy supplier market power and regional price spikes. To meet these challenges the public and policymakers have called for the expansion of policies to ensure that energy services remain readily available and affordable, while protecting public health and the environment. These policies, which helped to produce the low energy prices of the 1990's, include appliance efficiency standards, energy-saving building codes, vehicle fuel efficiency and tailpipe emissions standards, clean air legislation and caps on pollution from power plants. Over the 30-year period during which these policies have been in effect, the United States has reduced its energy per unit Gross Domestic Product by about one-third, even though the economy grew by 160 percent.

In order to create a responsible, forward-looking energy policy the United States will need to examine a number of important issues. Will the policy help meet America's energy needs? Will it enhance national security? Will it contribute to a strong economy? Will it help meet America's needs for a safe and healthy environment? In order to begin to answer these questions, World Wildlife Fund commissioned the Tellus Institute to consider the potential impacts of implementing a broad suite of clean energy policies over the next 20 years.

Our national choices regarding the production and use of energy have serious implications for our environment. At every step of the process, from extraction, to refining, to transport and combustion, fossil fuels have negative impacts on land and water-based ecosystems. In addition to these well-known effects, it is now clear that overreliance on fossil fuels is a major cause of climate change. Because we consider climate change one of the greatest global threats to biodiversity, we chose to consider a suite of policies that would address our energy needs while reducing our dependence on fossil fuels and decreasing emissions of greenhouse gases. We call this suite of policies the Climate Protection Scenario.

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- NO_x/SO_2 Cap and Trade
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Transport Sector
- Automobile Efficiency Standard Improvements
- Promotion of Efficiency Improvements in Freight Trucks
- Aircraft Efficiency Improvements
- Greenhouse Gas Standards for Motor Fuels
- Travel Demand Reductions and High Speed Rail

A detailed description of the policies can be found in Annex A.

By implementing this suite of policies we can bring together the various strands connecting our energy, environment, climate, and economic policies into a coherent and harmonious strategy. The expected employment, energy and economic, and environmental impacts are discussed in separate sections below. A detailed description of the methodologies applied can be found in Annex B.

I. EMPLOYMENT AND MACROECONOMIC IMPACTS

The study finds that implementation of the Climate Protection Scenario could lead to a net annual employment increase of over 700,000 jobs by 2010, increasing to about 1.3 million by 2020, while increasing overall national GDP and incomes. These benefits are spread widely across all sectors of the economy—including construction, transportation, motor vehicles, manufacturing, services, retail trade and agriculture. The benefits derive from using our energy resources more efficiently and cost-effectively, commercializing cleaner technologies, and recycling the revenues of an electric sector carbon cap and permit trade system to households and businesses. Each State would enjoy net increases in employment; incomes and economic output as benefits are likely to be spread widely across the country.

As the economy's reliance on carbon-intensive fossil fuels declines, some industries within the energy sector would not share in the economic benefits from this transition. This suggests that while there would be widespread gains to workers throughout the economy, it would be necessary to provide assistance and support that ensured a just transition for workers who would otherwise be displaced during the beginning of this transition. One source of financial resources for this assistance could be a portion of the revenues derived from the government auction of carbon permits. At the same time, energy suppliers could offset some potential employment losses by moving aggressively into the energy efficiency and renewable energy businesses and assisting their work forces in transitioning to these new fields. For example, with electric sector restructuring, some existing utilities and suppliers could shift toward providing energy-efficiency services and alternative energy. Similarly, natural gas and oil suppliers could shift toward providing alternative fuels such as those derived from biomass, wind, and solar resources.

National Impacts

Estimation of the macroeconomic impacts of the climate protection policies was based on the incremental investments and savings required to implement the policies found in the July 2001 study. The analysis tracks expenditures on more efficient lighting, high efficiency motors, more efficient automobiles and many other energy-using technologies that reduce consumption of high carbon fuels. These expenditures create incomes and jobs for the manufacturers and workers who produce the equipment and for the industries and workers who supply and service those producers. They also reduce the energy bills of offices, firms and households who utilize the more efficient technologies. The savings on energy bills will create additional income and jobs in the industries and services in which these new savings are spent.

Figure 1a: Job Impacts

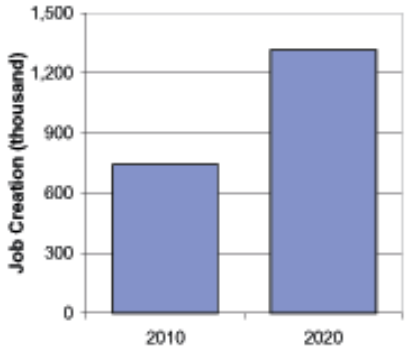


Figure 1b: Income Impacts

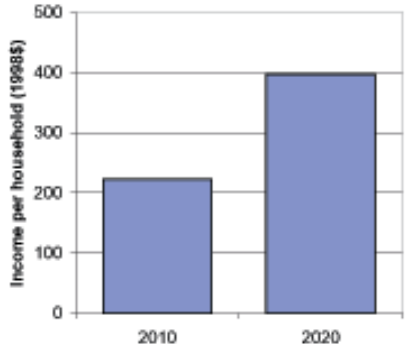
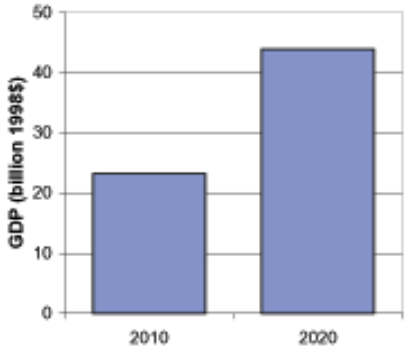


Figure 1c: GDP Impacts



The set of policies analyzed here gives rise to large energy savings, positive job impacts and new opportunities that far exceed the losses that would occur in the traditional energy supply sectors. The analyses also take account of recycling back

to households and business the revenues derived from government auction of carbon permits to electricity suppliers.

Figures 1a, 1b and 1c show the positive macroeconomic impacts of the Climate Protection Scenario—overall increases above base case in jobs, in incomes per household (a benefit in addition to household energy bill savings) and in GDP. By the year 2020, there would be an additional $400 per household increase in annual wage and salary earnings ($51.4 billion total), while about 1.3 million net new jobs would be created, relative to the base case. At the same time, GDP is projected to be about $43.9 billion above the base case in 2020. Major contributions to increases in annual wage and salary earnings arise from purchases of energy efficient equipment and the spending of net energy bill savings by businesses and households. While these increases are significant, the impacts are relatively small in comparison to overall economic activity. For instance, increasing the nation's GDP by $43.9 billion in 2020 represents only 0.4 percent of the $11.8 trillion (1998$) projected GDP for that year.

Table 1a shows that by 2010 there could be a net job increase of almost 750,000 jobs, with a net increase in annual wage and salary compensation of about $220 per household ($26 billion total) and a $23 billion net increase in GDP. Table 1b reveals that by 2020 these figures could grow to a net job increase of slightly more than 1.3 million jobs, a net increase in annual wage and salary compensation of about $400 per household ($51 billion total) and a net increase in GDP of $44 billion.

Table 1a: Macroeconomic Impacts of Policy Scenario by Sector, 2010

	Net Change in Wage		
	Net Change and Salary		Net Change in GDP (Million 1998$)
	In Jobs	Compensation (Million 1998$)	
Agriculture	18,600	$160	$530
Other Mining	6,900	$420	$880
Coal Mining	(10,100)	($990)	($2,090)
Oil/Gas Mining	(26,900)	($2,280)	($9,040)
Construction	353,200	$10,440	$14,990
Food Processing	2,700	$110	$210
Other Manufacturing	52,500	$3,980	$6,020
Pulp and Paper Mills	2,800	$240	$390
Oil Refining	(2,600)	($260)	($780)
Stone, Glass, and Clay	14,100	$750	$1,260
Primary Metals	11,800	$940	$1,360
Metal Durables	30,400	$2,140	$3,520
Motor Vehicles	36,500	$2,810	$4,610
Transportation, Communication, and Utilities	21,500	$1,100	$2,240
Electric Utilities	(18,400)	($1,900)	($10,070)
Natural Gas Utilities	(16,700)	($1,520)	($5,510)
Wholesale Trade	5,600	$350	$640
Retail Trade	14,400	$290	$510
Finance	31,600	$2,380	$4,890
Insurance/Real Estate	(5,900)	($160)	($1,110)
Services	191,900	$5,730	$8,080
Education	3,800	$140	$140
Government	27,200	$1,180	$1,550
Total	744,900	$26,050	$23,220

Table 1b: Macroeconomic Impacts of Policy Scenario by Sector, 2020

	Net Change in Wage		
	Net Change and Salary		Net Change in GDP (Million 1998$)
	In Jobs	Compensation (Million 1998$)	
Agriculture	63,100	$620	$2,120
Other Mining	11,200	$870	$1,830
Coal Mining	(23,900)	($2,340)	($4,940)

Table 1b: Macroeconomic Impacts of Policy Scenario by Sector, 2020—Continued

	Net Change in Wage		
	Net Change and Salary		Net Change in GDP (Million 1998$)
	In Jobs	Compensation (Million 1998$)	
Oil/Gas Mining	(61,400)	($5,210)	($20,600)
Construction	340,300	$10,460	$15,030
Food Processing	16,100	$750	$1,380
Other Manufacturing	77,900	$9,360	$14,160
Pulp and Paper Mills	5,000	$570	$950
Oil Refining	(6,300)	($650)	($1,910)
Stone, Glass, and Clay	24,800	$1,630	$2,750
Primary Metals	18,600	$2,190	$3,180
Metal Durables	42,000	$4,670	$7,670
Motor Vehicles	54,300	$5,090	$8,350
Transportation, Communication, and Utilities	50,500	$3,320	$6,750
Electric Utilities	(35,100)	($5,180)	($27,540)
Natural Gas Utilities	(26,200)	($3,080)	($11,180)
Wholesale Trade	12,400	$1,030	$1,890
Retail Trade	190,300	$4,410	$7,680
Finance	42,100	$4,570	$9,410
Insurance/Real Estate	11,900	$350	$2,420
Services	394,600	$13,080	$18,460
Education	33,200	$1,330	$1,340
Government	78,900	$3,550	$4,660
Total	1,314,300	$51,390	$43,860

State-By-State Employment Impacts

The preceding analysis suggests that implementing the Climate Protection Scenario policies would result in substantial net employment gains at the national level. Yet, estimates of State-level impacts provide important additional insight into the benefits of such a policy initiative.

The detailed distribution of the national employment impacts across the States is difficult to predict. However, it is likely that the large net benefits found in tables 1a and 1b will be rather widely and evenly distributed across the States, largely owing to the widespread effects of respending the energy savings. The results of our indicative analysis of the State-level employment are given in table 2.

Table 2: Job Impacts by State

	State	Net Job Gain 2010	Net Job Gain 2020
01	Alabama	13,100	22,600
02	Alaska	2,800	5,000
04	Arizona	11,200	19,900
05	Arkansas	7,500	13,200
06	California	77,400	141,400
08	Colorado	10,000	17,700
09	Connecticut	7,800	14,100
10	Delaware	2,200	3,800
11	District of Columbia	1,600	3,500
12	Florida	37,000	66,800
13	Georgia	21,300	38,300
15	Hawaii	2,700	5,000
16	Idaho	3,500	6,200
17	Illinois	31,900	56,400
18	Indiana	20,900	36,000
19	Iowa	8,300	14,700
20	Kansas	7,100	12,500
21	Kentucky	11,500	19,300
22	Louisiana	19,200	32,900
23	Maine	3,700	6,600
24	Maryland	12,500	22,000
25	Massachusetts	14,500	26,700

Table 2: Job Impacts by State—Continued

	State	Net Job Gain 2010	Net Job Gain 2020
26	Michigan	29,800	51,000
27	Minnesota	13,400	24,000
28	Mississippi	7,200	12,600
29	Missouri	15,100	26,600
30	Montana	2,300	4,000
31	Nebraska	4,700	8,500
32	Nevada	5,300	9,100
33	New Hampshire	2,800	5,000
34	New Jersey	20,200	36,200
35	New Mexico	4,200	7,100
36	New York	38,000	68,200
37	North Carolina	22,400	38,900
38	North Dakota	1,900	3,300
39	Ohio	34,600	59,900
40	Oklahoma	8,200	13,700
41	Oregon	8,600	15,600
42	Pennsylvania	31,600	55,500
44	Rhode Island	2,100	3,900
45	South Carolina	11,500	20,000
46	South Dakota	2,000	3,500
47	Tennessee	17,100	29,800
48	Texas	71,500	123,400
49	Utah	5,700	10,300
50	Vermont	1,600	2,800
51	Virginia	18,500	32,100
53	Washington	16,600	29,700
54	West Virginia	3,800	6,000
55	Wisconsin	14,900	26,300
56	Wyoming	1,700	2,600
	Total	744,900	1,314,300

Some of these State-level employment impacts are associated with the direct expenditures made for more efficient equipment and renewable technologies and fuels. Although manufacturers and venders of relevant products and services may not be uniformly spread across the States, they are rather widely dispersed. For example, manufacturers of advanced power plants, including gas turbines, natural gas combined cycle systems, combined heat and power units and fuel cells are located in many regions of the country. Manufacture of more efficient and alternative-fuel automobiles is likely to continue to be located largely with current manufacturers. Petroleum companies with experience in industrial chemistry can play a role in providing cellulosic ethanol or other synthetic fuels. Biomass fuels for transport and power generation will come from States that could provide biomass feedstock. In some States, farms could become sites for wind electric generators and derive income from these facilities.

While these energy-related purchases can stimulate local economic activity and jobs, the major drivers of the overall national employment increases are the net energy-bill savings to households and businesses, which tend to be spent on myriad other purchases across the economy. This spending occurs broadly across all sectors, with much of it local. In those States that supply fossil fuels, losses to these industries and related businesses would be more than offset by gains in other sectors of those State's economies, owing to the expenditures on more efficient equipment and cleaner energy resources and re-spending of energy bill savings. Thus, the national job increases—in construction, services, education, finance, government, miscellaneous manufacturing, agriculture and other sectors—would likely be widespread throughout the country.

While this analysis indicates that there would be overall employment benefits at the State as well as the national level, some industries could face near-term losses before they could adapt to new energy markets or before the benefits of the energy efficiency measures were fully realized. Some of the savings realized from implementing the policies could be used for assistance in a just transition for affected workers and communities.

States such as Texas, which are large energy producers and have relatively low energy prices compared with the national average, still enjoy large benefits. As table 2 indicates, the State of Texas, which currently leads the Nation in total energy con-

sumed and is second only to California in total energy expenditures, could expect to have a net gain of about 120,000 jobs in 2020 if these national energy policies were adopted.

II. ENERGY IMPACTS

In this section we analyze expected impacts of the Climate Protection Scenario policy package on energy consumption, energy prices, and household and business energy budgets.

Figure 2a shows how the Climate Protection Scenario policies affect our dependence on the consumption of fossil fuels, which declines by more than 15 percent between 2000 and 2020, rather than increasing by 40 percent as in the base case. Oil consumption itself declines by about 8 percent between 2000 and 2020 instead of increasing by 32 percent, largely from improved efficiency in vehicles and other transportation modes, thereby saving money and reducing vulnerability of citizens and our economy to oil price shocks. While most of this reduced fossil fuel dependence results from policies that induce energy efficiency, figure 2a also shows that the policy case increases the use of renewable energy, which roughly doubles from current levels instead of remaining essentially constant.

Figure 2a: Fossil and Renewable Energy Use: Base & Policy Cases

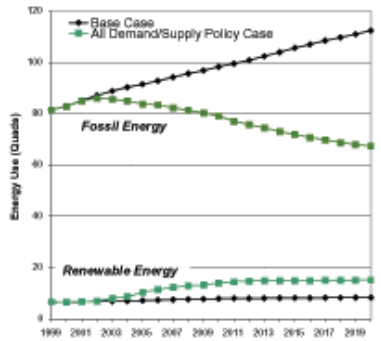


Figure 2b: Electricity Sales: Base & Policy Cases

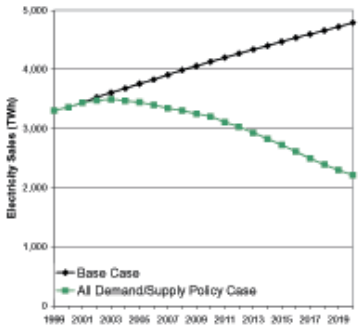


Figure 2b shows how electricity sales from central station power stations would be less than half of projections for 2020, owing to the policy of promoting more efficient equipment in homes and offices and using waste heat in combined heat and power plants in buildings and factories. Electricity sales would decline by 33 percent from 2000 to 2020 rather than increase by 45 percent. By 2020, electricity purchases by residential, commercial and industrial consumers would be 55 percent below business as usual and 20 percent of the remaining generation would come from wind, solar, biomass and geothermal energy.

Figures 3a and 3b show how the policies affect natural gas prices and the costs to households for electricity. Natural gas prices would decline to about 25 percent lower than the base case by 2020. All sectors would enjoy declines in their electricity bills, owing to greater efficiency, even though prices per unit of power would increase in moving to cleaner generation. By 2020 residential consumers would pay about $24 less per month.

Figure 3a: Natural Gas Prices, Base and Policy Cases

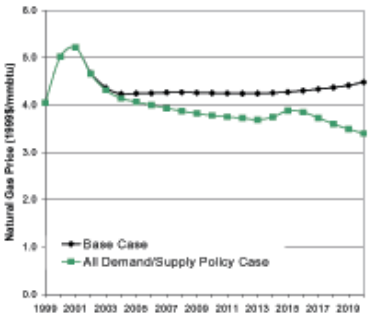
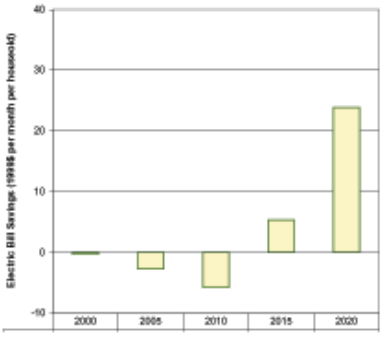


Figure 3b: Monthly Electric Bill Savings to Households



Figures 4a and 4b show that net savings to households and business would be substantial, reaching more than $600 billion combined by 2020.

Figure 4a: Cumulative Costs and Benefits – Households (billion $)

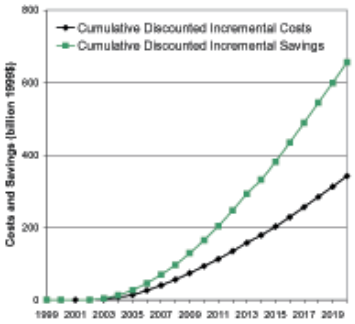
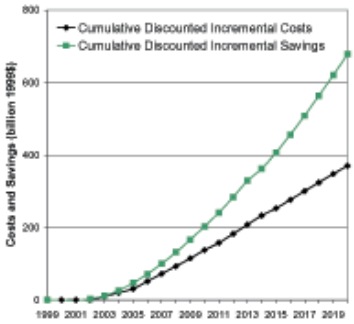


Figure 4b: Cumulative Costs and Benefits–Business, Industry (billion $)



III. ENVIRONMENTAL IMPACTS

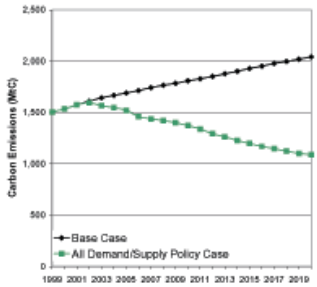
Virtually every step in the process of supplying energy from fossil fuels damages the environment. Drilling, mining and pipeline installation can disrupt whole ecosystems. Transportation of fossil fuels results in spills, threatening wildlife and human communities that depend on the natural environment. Fossil fuel combustion emits pollutants that cause global warming, acid rain and smog. Smog and other air pollutants can exacerbate lung disease and cause crop, forest and property damage. Acid rain acidifies the soil and water, killing plants, fish and animals that depend on them. The impacts of global warming pose the greatest global threat to biodiversity.

These environmental threats could be mitigated by a proactive effort to direct our energy supply system away from its current dependence on fossil fuels and toward increased energy efficiency and renewable energy technologies. However, current U.S. policies point in the opposite direction. The fossil fuel and nuclear industries continue to benefit from both direct and indirect subsidies from taxpayers, citizens and the environment, while cleaner energy resources and more efficient technologies are required to prove themselves in a not truly competitive marketplace. Despite the proven economic and environmental track record of energy efficiency, renewables, and pollution limitations, the administration's energy plan and the House of Representative's energy legislation continue to promote fossil fuels at the expense of the environment and the economy.

The policies in the Climate Protection Scenario begin to reduce our dependence on fossil fuels and would thereby dramatically change the trajectory of U.S. carbon emissions from their current rapidly rising path to a downward trajectory needed for long-term climate stabilization. Figure 5 shows that between 2000 and 2010, car-

bon emissions would decline by 8.5 percent rather than increase by the 20 percent projected in the base case. The July 2001 study shows that the Kyoto Protocol target could be met by implementing these cost-effective policies, reducing non-energy related greenhouse gases and utilizing international trading mechanisms. Under the Climate Protection Scenario, by 2020 carbon emissions would be 47 percent below business as usual and 19 percent below 1990 levels.

Figure 5: Carbon Emissions: Base & Policy Cases



At the same time, the proposed policies would virtually eliminate emissions of SO_2 and reduce NOx emissions by almost 30 percent, as shown in figures 6a and 6b below. In addition, the proposed policies would substantially reduce emissions of fine particulates, carbon monoxide, volatile organic compounds and mercury.

Figure 6a: SO_2 emissions: Base & Policy Cases

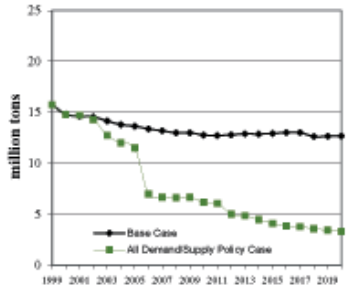
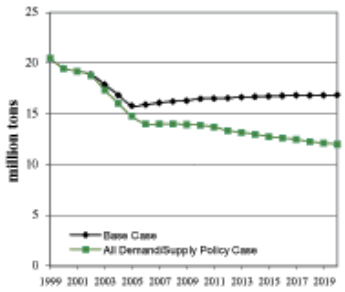


Figure 6b: NO_x Emissions: Base & Policy Cases



ANNEX A

POLICIES

This study examines a broad set of national policies that would increase energy efficiency, accelerate the adoption of renewable energy technologies, and shift to less use of carbon-intensive fossil fuels. The policies address major areas of energy use in the buildings, industrial, transport, and electrical sectors. Analyses of the investment costs and energy savings of policies to promote energy efficiency and cogeneration in the residential, commercial, and industrial sectors were taken primarily from the American Council for an Energy Efficient Economy (1999; 2001).

Below we group these policies into the particular sector where they take effect, and describe the key assumptions made concerning the technological impacts of the individual policies. Unless otherwise indicated, each of the policies is assumed to start in 2003.

As explained further in the methodology discussion in the next section, we adapted the Energy Information Administration's 2001 Reference Case Forecast (EIA 2001) to create a slightly revised "base case." Our policies and assumptions build on those included in this base case forecast (i.e., we avoid taking credit for emissions reductions, costs, or savings already included in the EIA 2001 Reference Case). When taken together, the policies described in this section represent a Climate Protection Scenario that the United States could pursue to achieve significant carbon reductions.

Policies in the Buildings and Industrial Sectors

Carbon emissions from fuel combustion in the buildings (including both residential and commercial) sector account for about 10 percent of U.S. greenhouse gas emissions, while emissions from the industrial sector account for another 20 percent. When emissions associated with the electricity consumed are counted, these levels reach over 35 percent for buildings and 30 percent for industry. We analyzed a set of policies that include new building codes, new appliance standards, tax incentives for the purchase of high efficiency products, a national public benefits fund, expanded research and development, voluntary agreements, and support for combined heat and power.

Building Codes

For this policy, we assume that DOE enforces the commercial building code requirement in the Energy Policy Act of 1992 (EPAct) and that States comply. We also assume that relevant States upgrade their residential energy code to either the 1995 or 1998 Model Energy Code, voluntarily or following adoption of a new Federal requirement. Furthermore, we assume that the model energy codes are significantly improved during the next decade, and that all States adopt mandatory codes that go beyond current "good practice" by 2010. To quantify the impact of these changes, we assume a 20 percent energy savings in heating and cooling in buildings in half of new homes and commercial buildings.

New Appliance and Equipment Efficiency Standards

For this policy, we assume that the government upgrades existing standards or introduces new standards for key appliances and equipment types: distribution transformers, commercial air conditioning systems, residential heating systems, commercial refrigerators, exit signs, traffic lights, torchiere lighting fixtures, ice makers, and standby power consumption for consumer electronics. We also assume higher energy efficiency standards for residential central air conditioning and heat pumps than was recently allowed by the Bush Administration. These are measures that can be taken in the near term, based on cost-effective available technologies.

Tax Incentives

This policy provides initial tax incentives for a number of products. For consumer appliances, we assumed a tax incentive of $50 to $100 per unit. For new homes that are at least 30 percent more efficient than the Model Energy Code, we assumed an incentive of up to $2,000 per home; for commercial buildings with at least 50 percent reduction in heating and cooling costs relative to applicable building codes, we applied an incentive of $2.25 per square foot. For building equipment such as efficient furnaces, fuel cell power systems, gas-fired heat pumps, and electric heat pump water heaters, we assumed a 20 percent investment tax credit. Each of these incentives would be introduced with a sunset clause, terminating them or phasing them out in approximately 5 years, to avoid their becoming permanent subsidies.

National Public Benefits Fund

Electric utilities have historically funded programs to encourage more efficient energy-using equipment, assist low-income families with home weatherization, commercialize renewables, and undertake research and development (R&D). Such programs have typically achieved electricity bill savings for households and businesses that are roughly twice the program costs (Nadel and Kushler, 2000). Despite these successes, electric industry restructuring, deregulation, and increasing price competition have caused utilities to reduce these "public benefit" expenditures over the past several years. In order to preserve such programs, 15 States have instituted public benefits funds that are financed by a small surcharge on all power delivered to consumers.

This study's policy package includes a national-level public benefits fund (PBF) fashioned after the proposal introduced by Sen. Jeffords (S. 1333). The PBF would levy a surcharge of 0.2 cents per kilowatt-hour on all electricity sold, costing the typical residential consumer about $1 per month. This Federal fund would provide matching funds for States for approved public benefits expenditures. In this study,

the PBF is allocated to several different programs directed at improvements in lighting, air conditioning, motors, and other cost-effective energy efficiency improvements in electricity-using equipment.

Expand Federal Funding for Research and Development in Energy Efficient Technologies

Federal R&D funding for energy efficiency has been a spectacularly cost-effective investment. The DOE has estimated that the energy savings from 20 of its energy efficiency R&D programs has been roughly $30 billion so far—more than three times the Federal appropriation for the entire energy efficiency and renewables R&D budget throughout the 1990's (EERE, 2000).

Tremendous opportunities exist for further progress in material-processing technologies, manufacturing processing, electric motors, windows, building shells, lighting, heating/cooling systems, and super-insulation, for example. EPA's Energy Star programs have complemented and amplified the impact of Federal R&D, by labeling and certifying to increase consumer awareness of energy efficiency opportunities. R&D efforts should be increased and EPA should be allocated the funds to broaden the scope of its Energy Star program, expanding to other products (refrigerators, motors) and building sectors (hotels, retailers), and the vast market of existing buildings that could be retrofitted. In this study, we assume that increased funding to expand research and development efforts in industry (e.g., motors), buildings (e.g., advanced heating/cooling), and transport (e.g., more fuel-efficient cars and trucks) will lead to more energy-savings products becoming commercially available.

Industrial Energy Efficiency through Intensity Targets

There is great potential for cost-effective efficiency improvements in both energy-intensive and non-energy intensive industries (Elliott 1994). For example, an in-depth analysis of 49 specific energy-efficient technologies for the iron and steel industry found a total cost-effective energy savings potential of 18 percent (Worrell, Martin, and Price 1999). In this study, we assume Federal initiatives to motivate and assist industry to identify and exploit energy efficiency opportunities. Government agencies would provide technical and financial assistance, and expand R&D and demonstration programs. In addition to these carrots, government may need to brandish a stick in order to induce a large fraction of industries to make serious energy efficiency commitments. If industry does not respond to the Federal initiatives at a level sufficient to meet progressive energy efficiency targets, a mandatory, binding energy intensity standard should be triggered to ensure the targets are attained.

Support for Co-generation

Cogeneration (or, combined heat and power—CHP) is a super-efficient means of coproducing two energy-intensive products that are usually produced separately—heat and electricity. The thermal energy produced in cogeneration also can be used for (building and process) cooling or to provide mechanical power. While CHP already provides about 9 percent of all electricity in the United States, there are considerable barriers to its wider cost-effective implementation (Elliott and Spurr, 1999). In this study, we assume the adoption of policies to establish a standard permitting process, uniform tax treatment, accurate environmental standards, and fair access to the grid to sell or purchase electricity. Such measures would help to unleash a significant portion of the enormous potential for CHP. In this study, we assumed 50 GW of new CHP capacity by 2010, and an additional 95 GW between 2011 and 2020. With electricity demand reduced by the various energy efficiency policies adopted in this study, cogenerated electricity reaches 8 percent of total remaining electricity requirements in 2010 and 36 percent in 2020.

Policies in the Electric Sector

A major goal of U.S. energy and climate policy will be to dramatically reduce carbon and other pollutant emissions from the electric sector, which is responsible for more than one-third of all U.S. greenhouse gas emissions. We analyzed a set of policies in the electric sector that include standards and mechanisms to help overcome existing market barriers to investments in technologies that can reduce emissions. Three major policies—a renewable portfolio standard, a cap on pollutant emissions, and a carbon cap and trade system—were analyzed as described below.

Renewable Portfolio Standard

A Renewable Portfolio Standard (RPS) is a flexible, market-oriented policy for progressively increasing the use of renewable energy resources and technologies for electricity production. An RPS sets a minimum requirement for the fraction of total electricity generation to be met by renewable electricity in each year, and requires

each supplier of electricity to meet the minimum either by producing that fraction in its mix or by acquiring credits from suppliers that exceed the minimum. The market determines the portfolio of technologies and geographic distribution of facilities that meet the national target at least cost. This is achieved by a trading system that awards credits to generators for producing renewable electricity and allows them to sell or purchase these credits. Thirteen States—Arizona, Connecticut, Hawaii, Iowa, Maine, Massachusetts, Minnesota, Nevada, New Jersey, New Mexico, Pennsylvania, Texas, and Wisconsin—already have Renewable Portfolio Standards. Senator Jeffords has introduced a bill (S. 1333) that would establish a national RPS.

The RPS provides strong incentives for suppliers to design and site the lowest cost, highest value and most reliable renewable electricity projects. It also provides assurance and stability to renewable technology vendors, by guaranteeing markets for renewable power and allowing them to capture the financial and administrative advantages that come with planning in a more stable market environment. Yet it still maintains a competitive environment that encourages developers to innovate. Finally, by accelerating the deployment of renewable technologies and resources, the RPS also accelerates the learning and economies of scale that will allow renewable resources and technologies to become increasingly competitive with conventional technologies. This is particularly important, as the demands of climate stabilization in coming decades will require more renewable energy than we can deploy in the next two decades.

In this study, we have applied an RPS that starts at a 2 percent requirement in 2002, grows to 10 percent in 2010, and to 20 percent in 2020, after all efficiency policies are included. Wind, solar, geothermal, biomass, and landfill gas are eligible renewable sources of electricity, but environmental concerns exclude municipal solid waste (owing to concerns about toxic emissions from waste-burning plants) and large-scale hydro (which raises environmental concerns and need not be treated as an emerging renewable resource as it already supplies nearly 10 percent of the nation's electricity supply). We also assume a subsidy to grid-connected solar photovoltaic electricity generation, in order to introduce a small amount of this technology into the generation mix. The purpose of this is to induce technology learning, performance improvement and scale economies to help achieve increased technology diversity and another zero emissions option for the longer term. The level is kept small so that cost and price impacts are minimal.

Tightening of SO_2 and NOx Emission Regulations

The Clean Air Act Amendments currently require minimal to modest emissions reductions through 2010 and no reductions after that. Yet, despite the improvements brought about by the Clean Air Act and its amendments, recent studies have confirmed that SO_2 and NOx continue to damage lake and forest ecosystems, decrease agricultural productivity and harm public health through its impact on urban air quality (Clean Air Task Force, 2000.)

In this study, we assume a tightened SO_2 cap-and-trade system that reduces sulfur dioxide emissions to roughly 40 percent of current levels by 2010 and to one-third of current levels by 2020. We also impose a cap-and-trade system on NOx emissions in the summertime, when NOx contributes more severely to photochemical smog. This system expands the current cap-and-trade program, which calls on 19 States to meet a target in 2003 that then remains constant and includes all States with a cap that is set first in 2003 but decreases in 2010, relative to 1999 levels. The cap results in a 45 percent reduction from current annual electric sector NOx emissions by 2010 and 83 percent by 2020.

Carbon Cap-And-Trade Permit System

This study assumes that a cap-and-trade system for carbon dioxide emissions is introduced in the electric sector. The cap is set to achieve progressively more stringent targets over time, starting in 2003 at 2 percent below current levels, increasing to 12 percent below current levels by 2010 and 30 percent below by 2020. A progressively more stringent target reduces demand for coal, and hence both combustion-related air pollution and mining-related pollution of streams and degradation of landscapes and terrestrial habitats.

In the SO_2, NOx, and CO_2 trading systems, permits are distributed through an open auction, and the resulting revenues can be returned to households (e.g., through a tax reduction or as a rebate back to households). Recent analyses suggest that an auction is the most economically efficient way to distribute permits, as it would meet emissions caps at lower cost than allocations based on issuing grandfathered allowances or equal per kWh allowances (Burtraw, et al. 2001). Implementing such auctions for the electric sector also could set the stage for an economy-

wide approach to carbon reduction in future years based on auctioning. In this study, the price of auctioned carbon permits reaches $100 per metric ton carbon.

With a cap-and-trade system in place for CO_2, SOx and NOx, this scenario reduces multiple emissions from power plants in a manner similar to proposals currently under consideration in Congress. The reductions in these three pollutants are as deep as those imposed in four pollutant bills, and are achieved within a comparable timeframe. (The Department of Energy's NEMS model unfortunately does not explicitly track mercury, making it impossible to compare the results of this study to the mercury requirement in S. 556 and H.R. 1256.)

Policies in the Transport Sector

Another goal of U.S. energy and climate policy will be to reduce oil use, carbon emissions and pollution from the transport sector, which is responsible for about one-third of all U.S. greenhouse gas emissions. We analyzed a set of policies in the transportation sector that include improved efficiency (light duty vehicles, heavy duty trucks and aircraft), a full fuel-cycle GHG standard for motor fuels, measures to reduce road travel, and high speed rail.

Strengthened Fuel Economy Standards

Today's cars are governed by fuel economy standards that were set in the mid-1970's. The efficiency gains made in meeting those standards have been entirely overwhelmed by increases in population and driving, as well as the trend toward gas-guzzling SUVs. When the fuel economy standards were implemented, light trucks only accounted for about 20 percent of personal vehicle sales. Light trucks now account for nearly 50 percent of new vehicle sales; this has brought down the overall fuel economy of the light duty vehicle fleet, which now stands at its lowest average fuel economy since 1981. If the fuel economy of new vehicles had held at the levels for vehicles sold in 1981, rather than tipping downward, American vehicle owners would be importing half a million fewer barrels of oil each day.

In this study, we introduce a strengthened Corporate Average Fuel Economy (CAFE) standard for cars and light trucks, along with complementary market incentive programs. Specifically, fuel economy standards for new cars and light trucks rise from EIA's projected 25.2 mpg for 2001 to 36.5 mpg in 2010, continuing to 50.5 mpg by 2020. This increase in vehicle fuel economy would save by 2020 approximately twice as much oil as could be pumped from an Arctic National Wildlife Refuge oil field over its entire 50-year lifespan (USGS, 2001). Based on assessments of near-term technologies for conventional vehicles, and advanced vehicle technologies for the longer-term, we estimate that the 2010 CAFE target can be met with an incremental cost of approximately $855 per vehicle, and the 2020 CAFE target with an incremental cost of $1,900.[1] To put these costs in perspective, the fuel savings at the gasoline pump for these more efficient vehicles would be two to three times these incremental costs over the vehicle's lifetime.[2]

Improving Efficiency of Freight Transport

We also assume policies to improve fuel economy for heavy-duty freight trucks, which account for approximately 16 percent of all transport energy consumption. Improvements such as advanced diesel engines, drag reduction, rolling resistance, load reduction strategies, and low friction drivetrains would increase the fuel economy, and thus decrease the oil requirements, of freight trucks. Many of these technologies are available today while others, such as advanced diesel and turbine engines, have been demonstrated technically but are not yet commercially available.

To accelerate the improvement in heavy duty truck efficiency, we have assumed expanded R&D for heavy duty diesel technology, vehicle labeling and promotion, financial incentives to stimulate the introduction of new technologies, efficiency standards for medium-and heavy-duty trucks, and fuel taxes and user-fees calibrated to eliminate the existing subsidies for freight trucking. Together, it is estimated that these policies could bring about a fuel economy improvement of 6 percent by 2010, and 23 percent by 2020, relative to today's trucks.

Improving Efficiency of Air Travel

Air travel is the fastest growing mode of travel, and far more energy intensive than vehicle travel. One passenger mile of air travel today requires about 1.7 times as much fuel as vehicle travel.[3] We assume policies to improve the efficiency of air

[1]Assuming a mean value at a market price of oil of $20/barrel.

[2] Assuming a retail price of gasoline of $1.50/gallon, a 10-year life of the vehicle, and 12,000 miles per year.

[3] Assuming typical vehicle load factors of 0.33 for autos and 0.6 for aircraft.

travel, including R&D for efficient aircraft technologies, fuel consumption standards, and a revamping of policies that subsidize air travel through public investments.

We assume that air travel efficiency improves by 23 percent by 2010, and 53 percent by 2020, owing to a combination of aircraft efficiency improvements (advanced engine types, lightweight composite materials, and advanced aerodynamics), increased load factor, and acceleration of air traffic management improvements (Lee et al., 2001; OTA, 1994; Interlaboratory Working Group, 2000). This is in contrast to the base case in which efficiency increases by 9 percent by 2010 and 15 percent by 2020. While we assume that air travel can reach 82 seat-miles per gallon by 2020 from its current 51, it is technologically possible that far greater efficiencies approaching 150 seat-miles per gallon could be achieved, if not in that time period then over the longer term (Alliance to Save Energy et al., 1991).

Greenhouse Gas Standards for Motor Fuels

Transportation in the United States relies overwhelmingly on petroleum-based fuels, making it a major source of greenhouse gas (GHG) emissions. We introduce here a full fuel-cycle GHG standard for motor fuels, similar in concept to the Renewable Portfolio Standard for the electric sector.

The policy assumed in this study requires a 3 percent reduction in the average national GHG emission factor of fuels used in light duty vehicles in 2010, increasing to a 7 percent reduction by 2020. Expanded R&D, market creation programs, and financial incentives would complement this policy. Such a program would stimulate the production of low-GHG fuels such as cellulosic ethanol and biomass-or solar-based hydrogen.

For this study, we assume that most of the low-GHG fuel is provided as cellulosic ethanol, which can be produced from woody matter from agricultural residues, forest and mill wastes, urban wood wastes, and short rotation woody crops (Walsh et al., 1997; Walsh et al., 1999). As cellulosic ethanol can be coproduced along with electricity, we assume that electricity output reaches 10 percent of ethanol output by 2010 and 40 percent by 2020 (Lynd, 1997). We assume that the price of cellulosic ethanol falls to $1.40 per gallon of gasoline equivalent by 2010 owing to the accelerated development of the production technology, and remains at that price thereafter (Interlaboratory Working Group, 2000).

Improving Alternative Modes to Reduce Vehicle Miles Traveled

The amount of travel in cars and light duty trucks continues to grow due to increasing population and low vehicle occupancy. Between 1999 and 2020, the rate of growth in vehicle miles traveled is projected to increase in the base case by about 2 percent per year. The overall efficiency of the passenger transportation system can be significantly improved through measures that contain the growth in vehicle miles traveled through land-use and infrastructure investments and pricing reforms to remove implicit subsidies for cars, which are very energy intensive. We assume that these measures will primarily affect urban passenger transportation and result in a shift to higher occupancy vehicles, including carpooling, vanpooling, public transportation, and telecommuting. We consider that the level of reductions of vehicle miles traveled that can be achieved by these measures relative to the base case are 8 percent by 2010 and 11 percent by 2020.

High Speed Rail

High speed rail offers an attractive alternative to intercity vehicle travel and short distance air travel. In both energy cost and travel time, high-speed rail could compete with air travel for trips of roughly 600 miles or less, which account for about one-third of domestic air passenger miles traveled. Investments in rail facilities for key intercity routes (such as the Northeast corridor between Washington and Boston, the east coast of Florida between Miami and Tampa, and the route linking Los Angeles and San Francisco) could provide an attractive alternative and reduce air travel in some of the busiest flight corridors (USDOT, 1997). High-speed rail can achieve practical operating speeds of up to 200 mph. Prominent examples include the French TGV, the Japanese Shinkansen and the German Intercity Express. An emerging advanced transport technology is the MAGLEV system in which magnetic forces lift and guide a vehicle over a specially designed guideway. Both Germany and Japan are active developers of this technology.

In this analysis we have taken the USDOT's recent estimates of the potential high speed rail ridership which, based on projected mode shifts from air and automobile travel in several major corridors of the United States, reaches about 2 billion passenger miles by 2020 (USDOT, 1997). While this level of high speed rail ridership provides relatively small energy and carbon benefits by 2020, it can be viewed as the first phase of a longer-term transition to far greater ridership and more advanced, faster and efficient electric and MAGLEV systems in the ensuing decades.

ANNEX B

METHODOLOGY: ECONOMIC IMPACTS ANALYSIS

The overall energy and economic analysis starts with a business-as-usual energy-economic forecast based on the U.S. Department of Energy, Energy Information Administration's Annual Energy Outlook for 2001. This base case reflects a continuation of existing energy consumption and technology trends and policies, and presumes no efforts are taken to reduce greenhouse gas emissions.

Employment impacts from the policy scenarios were computed as net incremental impacts in specified future years. They are derived from the changes in expenditures on energy:

> . . . operating costs and fuel costs—brought about by investments in energy efficiency and renewable technologies in each sector. The net impacts of these changes on the nation's economy were computed from the following: 1) the net changes in employment; 2) the net changes in wage and salary compensation, measured in millions of 1998 dollars; and 3) the net changes in Gross Domestic Product (GDP), also measured in millions of 1998 dollars.

The analysis used data derived from IMPLAN (IMpact Analysis for PLANning), a widely used input-output (I-O) model that analyzes interactions between different sectors of the economy. IMPLAN was used to track the changes in each sector's demand and spending patterns, as caused by shifts in fuel consumption and energy technology investments owing to the policies, and the shifts induced in other sectors' levels of output (and the inputs required).

The results of these interactions are captured through appropriate sectoral multipliers (jobs, income, and GDP per dollar of output). For each benchmark year (2010 and 2020), each change in a sector's spending pattern is matched to an appropriate sectoral multiplier. The analytical approach used here is similar to that in Geller, DeCicco and Laitner (1992); Laitner, Bernow and DeCicco (1998); Goldberg et al. (1998); and Bernow et al. (1999). These reports offer a more in-depth discussion of methodological issues.

Input-output models were initially developed to trace supply linkages in the economy. Thus, the impacts generated from the policy scenario depend on the structure of the economy. For example, I-O models can show how increasing purchases of more efficient lighting equipment, more efficient cars, high efficiency motors, modular combined heat and power plants, or biomass energy not only directly benefit their respective producers, but also benefit those industries that provide inputs to the manufacturers. I-O models also can be used to show the benefits from indirect economic activity that occur as a result of these transactions (e.g., banking and accounting services) and the re-spending of energy bill savings throughout the economy. Therefore, spending patterns for energy have an effect on total employment, income (i.e., wage and salary compensation), and GDP.

For each sector of the economy, multipliers were used to compute the impacts of the incremental expenditures. These multipliers identified the employment or economic activity generated from a given level of spending in each sector. Changes in expenditures were matched with appropriate multipliers. For instance, employment multipliers show the number of jobs that are directly and indirectly supported for each one million dollars of expenditure in a specific sector.

For this analysis, a job is defined as sufficient wages to employ one person full-time for 1 year. The employment multipliers for key sectors of the economy are listed in table A.1, below.

The analysis in this study includes several modifications made to the methodology of merely matching expenditures and multipliers. First, an assumption was made that 85 percent of the efficiency investments would be spent within the United States. While local contractors and dealers traditionally carry out upgrades of energy efficiency, this analysis recognizes that foreign suppliers and contractors may also be involved.

Second, we made an adjustment in the employment impacts to account for future changes in labor productivity in specific sectors. Utilizing data from the Bureau of Labor Statistics Economic and Employment Projections 1988, 1998, and 2008, we developed productivity trends for our analysis. These trends suggest that productivity rates are expected to vary widely among sectors. Annual productivity gains are forecast to range from 0.4 percent annually in the construction sector (which will experience a large influx of employment as those sectors become more important to the economy) to 7.4 percent annual productivity gain in oil and gas mining. These factors are given in table A.2, below.

Third, we assumed that 80 percent of the investment upgrades would be financed by bank loans carrying an average 10 percent real interest rate over a 5-year period.

No parameters were established to account for changes labor participation rates or for changes in interest rates as less capital-intensive technologies (i.e., efficiency investments) are substituted for conventional supply strategies. Although the higher cost premiums associated with the efficiency investments might be expected to increase the level of borrowing in the short term, and therefore, interest rates, this could be offset somewhat by avoided investments in new power plant capacity, exploratory well drilling, and new pipelines. Similarly, while a demand for labor may tend to increase the overall level of wages (and potentially lessen economic activity), the employment benefits from the scenario are relatively small compared with the national level of unemployment.

Fourth, for the residential and commercial sectors, it was assumed that program and marketing expenditures would be required to help promote market penetration of efficiency improvements due to the dispersed nature of the decisionmakers and the need for greater efforts toward market transformation. This was set at 15 percent of the efficiency investments for those sectors. No program or marketing expense was included for the industrial sector or transportation sector. We assume market penetration is naturally occurring in the industrial sector as decisionmakers adopt cost-effective and more efficient processes and older, less efficient equipment is replaced with newer, higher efficiency models. In the transportation sector efficiency improvements are assumed to be a part of all new vehicle purchases.

Finally, the analysis took account of the fact that the electric sector carbon cap-and-trade system would involve government auctioning of carbon allowances to electricity suppliers. This was modeled by (1) assuming purchases of the requisite allowances by utilities from the government; (2) payments for the corresponding higher costs of electricity by households and businesses; and (3) a return of the revenues collected by the government to households and businesses.

These results should be taken as indicative, as there are always limits to such a modeling exercise. The analyses do not account for feedback through final demand reductions, input substitution owing to price changes, feedback from inflation, and the constraints on labor and money supplies. They also assume that available labor, plant and materials are not fully utilized. Thus, for example, they assume that there is unemployment in those existing or potential skill areas, for which demand could be induced by policies that shift expenditures to nonenergy commodities. This is contrary to many other economic models, which in effect assume that there is full employment, and that the shift in expenditures from energy to other commodities would not create new jobs. Their view would be that the shift in expenditures would provide largely counter-recessionary jobs, but not many sustained job increases. Yet, it is well known that there is structural as well as business-cycle unemployment. Moreover, economic activity in some sectors such as construction (which enjoys the largest amount of induced jobs in our analysis) where job entry is impeded by cyclical and unstable demand and expectations, could experience sustained increases if a sustained path of increased final demands were established as they are in our policy scenarios.

In addition, while the models used for the energy analyses capture some policy-induced technology innovation, this is limited primarily to the electric sector. The I-O analysis also does not include the potential productivity benefits that could stem from the investments in new and more efficient equipment, and associated changes in organization, know-how and inter-industry interactions. Industrial investments that improve energy efficiency could be accompanied by improved product quality, lower capital and operating costs, increased employee productivity, easier and less costly environmental compliance, and entry into niche markets (see, e. g., Elliott et al. 1997; Laitner 1995; OTA 1994; Porter and Van Linde 1995). Even under full employment, energy policies that improve the efficiency of the economy could increase incomes per worker. Finally, such job-inducing policies could help counteract recessionary business cycles. It would be valuable to develop tools and refine the analyses to account for some of these factors and obtain a more detailed characterization of the results.

For the State-by-State employment impacts, we developed indicative estimates of the distribution of the approximately 1.3 million net national jobs gained by 2020 across the 50 States and the District of Columbia. Absent a more detailed analysis of each individual State or region, we allocated the national job impacts by weighting the key variables to create an overall State-by-State assessment. This estimate reflects the significant energy and economic differences across the States. The key variables used in this assessment were differences in energy prices; the level of energy consumed for each dollar of economic activity in the State; the number of energy-related jobs as a percent of total State employment; and the number of State jobs as a percent of national employment. The results are presented in table

2, which shows a positive net job impact in each State, ranging up to a high of about 140,000 in California by 2020.

Table A.1

Employment Multipliers for Select Economic Sectors

Sector	Multiplier
Agriculture	27.3
Coal Mining	9.9
Oil/Gas Mining	8.2
Other Mining	10.4
Construction	18.1
Food Processing	16.9
Pulp and Paper Mills	11.6
Oil Refining	6.9
Stone, Glass, and Clay	13.2
Primary Metals	12.8
Metal Durables	13.1
Motor Vehicles	10.6
Other Manufacturing	13.3
Transportation, Communication, and Utilities	13.9
Electric Utilities	5.2
Natural Gas Utilities	6.6
Wholesale Trade	13.4
Retail Trade	29.2
Finance	10.7
Insurance/Real Estate	8.1
Services	22.9
Education	28.9
Government	18.0

Table A.2

Labor Productivity Rates for Select Economic Sectors Employment Multipliers for Select Economic Sectors

Sector	Rate
Agriculture	1.6 percent
Coal Mining	5.2 percent
Oil/Gas Mining	7.4 percent
Other Mining	2.4 percent
Construction	0.4 percent
Food Processing	1.0 percent
Pulp and Paper Mills	3.0 percent
Oil Refining	3.3 percent
Stone, Glass, and Clay	2.2 percent
Primary Metals	4.0 percent
Metal Durables	4.7 percent
Motor Vehicles	2.0 percent
Other Manufacturing	4.7 percent
Transportation, Communication, and Other Utilities	2.5 percent
Electric Utilities	2.5 percent
Natural Gas Utilities	1.5 percent
Wholesale Trade	3.0 percent
Retail Trade	1.4 percent
Finance	3.7 percent
Insurance/Real Estate	0.8 percent
Services	1.1 percent
Education	1.0 percent
Government	0.4 percent

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THE AMERICAN WAY TO THE KYOTO PROTOCOL: AN ECONOMIC ANALYSIS TO REDUCE CARBON POLLUTION

A STUDY FOR: WORLD WILDLIFE FUND

(By Alison Bailie, Stephen Bernow, William Dougherty, Michael Lazarus, Sivan Kartha)

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1. Executive Summary

This report presents a study of policies and measures that could dramatically reduce U.S. greenhouse gas emissions over the next two decades. It examines a broad set of national policies to increase energy efficiency, accelerate the adoption of renewable energy technologies, and shift energy use to less carbon-intensive fuels. The policies address major areas of energy use in residential and commercial buildings, industrial facilities, transportation, and power generation.

This portfolio of policies and measures would allow the United States to meet its obligations under the Kyoto Protocol Together when combined with steps to reduce the emissions of non-CO_2 greenhouse gases and land-based CO_2 emissions, and the acquisition of a limited amount of allowances internationally. This package would bring overall economic benefits to the United States, since lower fuel and electricity bills would more than pay the costs of technology innovation and program implementation. In 2010, the annual savings would exceed costs by $50 billion, and by 2020 by approximately $135 billion.

Currently, the Bush Administration is promoting an energy strategy based on augmenting fossil fuel supplies. This strategy does not help the United States shift away from diminishing fossil fuel supplies, it does not enhance U.S. energy security, and it does not reduce the environmental impacts of energy use. America needs an energy policy that takes us forward into the 21st Century by making climate change mitigation an integrated part of the plan.

Far from being the economically crippling burden that the Bush Administration alleges, ratifying the Kyoto Protocol and ambitiously reducing greenhouse gas emissions could initiate a national technological and economic renaissance for cleaner energy, industrial processes and products in the coming decades. In the United States, we therefore face an important challenge. We can embrace the challenge of climate change as an opportunity to usher in this renaissance, providing world markets with the advanced technologies needed to sustain this century's economic growth. Or we can be followers, leaving other more forward-looking countries to assume the global

leadership in charting a sustainable path and capturing the energy markets of the future.

Policies and measures

The climate protection strategy adopts policies and measures that are broadly targeted across the four main economic sectors: buildings, electricity generation, transportation, and industry. The policies considered for residential and commercial buildings include strengthened codes for building energy consumption, new appliance efficiency standards, tax incentives and a national public benefits fund to support investments in high efficiency products, and expanded research and development into energy efficient technologies. For the electric sector, policies included a market-oriented "renewable portfolio standard", a cap on pollutant emissions (for sulfur and nitrogen), and a carbon emissions permit auction. In the transport sector, policies are adopted to improve the fuel economy of passenger vehicles, freight trucks, and aircraft through research, incentives, and a strengthened vehicle fuel efficiency standards. Policies are also modeled to set a fuel-cycle greenhouse gas standard for motor fuels, reduce road travel through land use and infrastructure investments and pricing reforms, and increase access to high speed rail as an alternative to short distance air travel. In the industry sector, policies are adopted to exploit more of the vast potential for cogeneration of heat and power, and to improve energy efficiencies at industrial facilities through technical assistance, financial incentives, expanded research, and demonstration programs to encourage cost-effective emissions reductions.

Results

Energy use in buildings, industries, transportation, and electricity generation was modeled for this study using the U.S. Department of Energy's National Energy Modeling System (NEMS). The NEMS model version, data and assumptions employed in this study were those of EIA's Annual Energy Outlook (EIA 2001), which also formed the basis for the Base Case. We refined the NEMS model with advice from EIA, based on their ongoing model improvements, and drawing on expert advice from colleagues at the Union of Concerned Scientists, the National Laboratories and elsewhere.

Table ES. 1 Summary of results.

	1990[1]	2010 Base Case	2010 Climate Protection	2020 Base Case	2020 Climate Protection
End-use Energy (Quads)	63.9	86.0	76.4	97.2	72.6
Primary Energy (Quads)	84.6	114.1	101.2	127.0	89.4
Renewable Energy (Quads)					
NON-HYDRO	3.5	5.0	10.4	5.5	11.0
Hydro	3.0	3.1	3.1	3.1	3.1
Net GHG Emissions (MtCe/yr)	1,648	2,204	1,533	—	——
Energy Carbon	1,338	1,808	1,372	2,042	1,087
Land-based Carbon	—	—	−58	—	——
Non-CO_2 Gases	310	397	279	—	——
International Trade	—	—	−60	—	——
Net Savings[2]					
Cumulative present value (billion $)	—	—	$105	—	$576
Levelized annual (billion $/year)	—	—	$113	—	$49
Levelized annual per household ($/year)	—	—	$113	—	$375

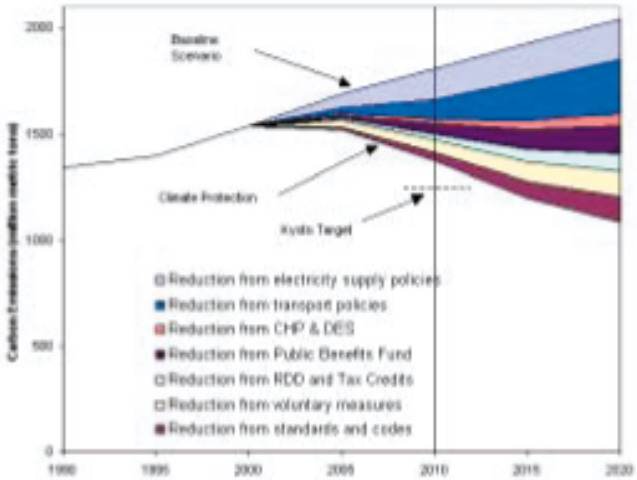
[1] Under Kyoto, the base year for three of the non-CO_2 GHGs (HFCs, PFCs, SF6) is 1995, not 1990, and the 1995 levels for these emissions are reported here.

[2] Savings are in 1999 $. The 2010 savings include $2.3 billion costs per year ($9 billion cumulative through 2010) of non-energy related measures needed to meet the Kyoto target. Costs are not included in 2020 since these measures policies do not extend past 2010.

Table ES. 1 provides summary results on overall energy and greenhouse gas impacts and economic impacts of the policy set for the Base Case and Climate Protection Case for 2010 and 2020. The policies cause reductions below in primary energy consumption that reach 11 percent by 2010 and 30 percent in 2020, relative to the Base Case in those years, through increased efficiency and greater adoption of cogeneration of heat and power (CHP). Relative to today's levels, use of non-hydro renewable energy roughly triples by 2010 in the Climate Protection Case, whereas in the Base Case it increases by less than 50 percent. Given the entire set of policies, non-hydro renewable energy doubles relative to the Base Case in 2010, accounting for about 10 percent of total primary energy supplies in 2010. When the electric sec-

tor RPS is combined with the strong energy efficiency policies of this study, the absolute amount of renewables does not increase substantially between 2010 and 2020 because the percentage targets in the electric sector have already been met. A more aggressive renewables policy for the 2010–2020 period could be considered (ACEEE, 1999).

Figure ES.1. Reductions in energy-related carbon emissions, displayed by major policy group



The reductions in energy-related carbon emissions are even more dramatic than the reductions in energy consumption, because of the shift toward lower-carbon fuels and renewable energy. Since 1990, carbon emissions have risen by over 15 percent, and in the Base Case would continue to rise a total of 35 percent by 2010, in stark contrast to the 7 percent emissions reduction that the United States negotiated at Kyoto. In the Climate Protection case, the United States promptly begins to reduce energy-related carbon emissions, and by 2010 emissions are only 2.5 percent above 1990 levels, and by 2020, emissions are well below 1990 levels. Relative to the Base case, the 2010 reductions[3] amount to 436 MtC/yr.

Energy-related carbon emissions are the predominant source of U.S. greenhouse gas emissions for the foreseeable future, and their reduction is the central challenge for protecting the climate. However, because the United States has made only minimal efforts to reduce emissions since it ratified the United Nations Framework Convention on Climate Change, it may not be able to meet it's Kyoto obligation with net economic benefits based solely on reductions in energy-related carbon dioxide emissions. Therefore, in order to meet the Kyoto target, the Climate Protection case also considers policies and measures for reducing greenhouse gases other than energy-related carbon dioxide.

In the Climate Protection case, land-based activities, such as forestry, changes in land-use, and agriculture, yield another 58 MtC/yr of reductions. (This figure corresponds to the upper limit for the use of land-based activities in the current negotiating text proposed by the current President of the U.N. climate talks Jan Pronk.) Methane emissions are also reduced, through measures aimed at landfills, natural gas production and distribution systems, mines, and livestock husbandry. The potent fluorine-containing greenhouse gases can be reduced by substituting with non-greenhouse substitutes, implementing alternative cleaning processes in the semicon-

[3]Throughout this report we refer to U.S. emissions target for the year 2010 to mean the average of the 5 year period from 2008 to 2012.

ductor industry, reducing leaks, and investing in more efficient gas-using equipment. In total, the Climate Protection case adopts reductions of these other greenhouse gases equivalent to 118 MtC/yr by 2010.

All together the reduction measures for energy-related carbon (436 MtC/yr), land-based carbon (58 MtC/yr), and non-carbon gases (118 MtCe/yr) amount to 612 MtCe/yr of reductions in 2010. Through these measures, the United States is able to accomplish the vast majority of its emissions reduction obligation under the Kyoto Protocol through domestic actions. This leaves the United States slightly shy of its Kyoto target, with only 60 MtC/yr worth of emissions allowances to procure from other countries though the "flexibility mechanisms" of the Kyoto Protocol—(Emissions Trading, Joint Implementation, and the Clean Development Mechanism). The Climate Protection case assumes that the United States will take steps to ensure that allowances procured through these flexibility mechanisms reflect legitimate mitigation activity. In particular, we assume that United States restrains its use of so-called "hot air" allowances, i.e, allowances sold by countries that received Kyoto Protocol targets well above their current emissions.

In addition to greenhouse gas emission reductions, the set of policies in the Climate Protection case also reduce criteria air pollutants that harm human health, cause acid rain and smog, and adversely affect agriculture, forests, water resources, and buildings. Implementing the policies would significantly reduce energy-related emissions as summarized in Table ES. 2. Sulfur oxide emissions would decrease the most—by half in 2010 and by nearly 75 percent in 2020. The other pollutants are reduced between 7 and 16 percent by 2010, and between 17 and 29 percent by 2020, relative to Base case levels in those years.

Table ES. 2: Impact of policies on air pollutant emissions

	1900	2010 Base Case	2010 Climate Protection	2020 Base Case	2020 Climate Protection
CO	65.1	69.8	63.8	71.8	59.8
NOx	21.9	16.5	13.9	16.9	12.0
SO_2	19.3	12.8	6.2	12.7	3.3
VOC	7.7	5.5	5.1	5.9	4.9
PM_{10}	1.7	1.5	1.3	1.6	1.3

The complete Climate Protection package—including measures to reduce energy-related, land-related, and non-carbon greenhouse gas emissions, as well as modest purchases of allowances—provides a net economic benefit to the United States. It also positively affects public health, by reducing emissions of the key air quality-reducing pollutants, including sulfur dioxide, nitrogen oxides, carbon monoxide, particulates, and volatile organic compounds. By dramatically reducing energy consumption, the Climate Protection strategy reduces our dependence on insecure energy supplies, while enhancing the standing of the United States as a supplier of innovative and environmentally superior technologies and practices.

2. Introduction

The earth's atmosphere now contains more carbon dioxide than at anytime over the past several hundred millennia. This precipitous rise in the major greenhouse gas, due to the combustion of fossil fuels since the dawn of the industrial age and the clearing of forests, has warmed the globe and produced climatic changes. What further changes will occur over the coming decades depends on how society chooses to respond to the threat of a dangerously disrupted climate. A concerted global effort to shift to energy-efficient technologies, carbon-free sources of energy and sustainable land-use practices, could keep future climate change to relatively modest levels. If, on the other hand, nations continue to grow and consume without limiting GHG emissions, future climate change could be catastrophic.

Dramatic climate change could unleash a range of dangerous physical, ecological, economic and social disruptions that would seriously undermine the natural environment and human societies for generations to come. Fortunately, a variety of effective policies, which have already been demonstrated, would mobilize current and new technologies, practices and resources to meet the challenge of climate protection. Strong and sustained action to reduce the risk of climate change could also reap additional benefits, such as reducing other air pollutants and saving money, plus help to usher in a new technological and institutional renaissance consistent with the goals of sustainable development. Here we focus on the U.S., which emits almost one-fourth of global carbon dioxide emissions. As a Nation, we have both the responsibility and the capability to take the lead in climate protection, and can di-

rectly benefit from actions taken. Recently, however, the Bush Administration has gravely disappointed the international community, proposing an energy strategy that is devoid of significant steps to protect the climate.

This report presents a study of policies and measures through which the United States could dramatically reduce its greenhouse gas emissions over the next two decades, while spurring technological innovation, reducing pollution, and improving energy security. The study is the latest in a series to which Tellus Institute has contributed, dating back to 1990, which have shown the economic and environmental benefits of energy efficiency and renewable energy resources. It updates and refines America's Global Warming Solutions (1999), which found that annual carbon emissions could be reduced to 14 percent below 1990 levels by 2010, with net economic benefits and reductions in air pollution.

Unfortunately, since that study, and indeed over the past decade since the Framework Convention on Climate Change was ratified by the U.S., the promise of these technologies and resources has gone largely unfulfilled, and little has been done to stem the tide of rapidly growing energy use and carbon emissions. This delay and paucity of action has rendered even more difficult the goal of reaching our Kyoto Protocol emissions target of 7 percent below 1990 levels by 2010. Nonetheless, the present study shows the substantial carbon reduction and other benefits that could still be achieved by 2010 with sensible policies and measures, even with this delayed start, and even greater benefits over the following decade. The policy and technological momentum established through 2020 would set the stage for the further reductions needed over the longer term to ensure climate stabilization.

The Risk of Climate Change

The world's community of climate scientists has reached the consensus that human activities are disrupting the Earth's climate (WGI, SPM, 2001; NAS, 2001; Int'l Academies of Science, 2001). Global emissions of CO_2 have steadily risen since the dawn of the industrial age, and now amount to about 6 billion tons of carbon released annually from fossil fuel combustion and 1 billion tons annually from land-use changes (mainly burning and decomposition of forest biomass). Without concerted efforts to curb emissions, atmospheric carbon dioxide levels would be driven inexorably higher by a growing global population pursuing a conventional approach to economic development.

While it is impossible to predict with precision how much carbon dioxide we will be emitting in the future, in a business-as-usual scenario annual emissions would roughly triple by the end of the century. By that time, the atmospheric concentration of carbon dioxide would have risen to three times pre-industrial levels (IPCC WGI, 2001). The climatic impacts of these rising emissions could be dramatic. Across a range of different plausible emissions futures explored by the IPCC, global average temperatures are calculated to rise between 3 to 10 degrees Fahrenheit (1.5 to 6 degrees Centigrade), with even greater increases in some regions (IPCC 2001). Such temperature changes would reflect a profound transformation of the Earth's climate system, of the natural systems that depend upon it and, potentially, of the human societies that caused the changes.

The potential consequences of such climate change are myriad and far-reaching. Sea level could rise between 3.5 to 35 inches (9—88 centimeters) (IPCC WGI, 2001), with severe implications for coastal and island ecosystems and their human communities. Hundreds of millions of people in the United States and abroad live in coastal regions that would be inundated by a 17 inch (44 cm) rise in sea level. Most of these regions are in developing countries that can scarcely afford to expend resources on building dikes and resettling communities. Climate disruption would also entail more frequent, prolonged, and intense extreme weather events, including storms and droughts, the timing, conditions and character of which would remain unpredictable.

Under the stresses courted by continuing current energy practices, climate and ecological systems could undergo very large and irreversible changes, such as a shift in the major ocean currents. Global warming itself could increase the rate of greenhouse gas accumulation, uncontrollably accelerating global warming and its impacts. For example, a thawing of the arctic tundra could release methane at rates far beyond today's anthropogenic rates, and a warming of the oceans could shift them from a net sink to a net source of carbon dioxide.

Moreover, large and irreversible changes could occur very rapidly. Recent scientific evidence from pre-historic ice cores shows that major climate changes have occurred on the time scale of about a decade (Schneider 1998; Severinghaus et al. 1998). Rapid change could cause additional ecological and social disruptions, limiting our ability to adapt. This could render belated attempts to mitigate climate change more hurried, more costly, less effective, or too late. Consequently, early and

sustained action, across many fronts, is needed to effect the technological, institutional and economic transitions to protect global climate and the ecological and social systems that depend on climate stability.

Protecting the Climate

The carbon dioxide already released by human activities will linger in the atmosphere for a hundred years or so. This carbon has already changed the climate, and will continue to do so as long as it remains in the atmosphere. But the degree of climate change to which we're already committed pales in comparison to the disruption that humankind would wreak if it continues to recklessly emit more carbon.

An aggressive strategy to curb emissions might limit warming to less than 2 degrees F over the next century (on top of the 1.0 degrees C that has already occurred over the past century). A temperature increase of about 0.2 degrees F per decade would still exceed natural variability, but would occur gradually enough to allow many, though not all, ecosystems to adapt (Rijsberman and Swart, 1990). To be sure, this goal would not entirely eliminate the risks of disruptive climate change. Warming in some areas would significantly exceed 2 degrees F, the rising sea level would inundate some coastal areas, and changing rainfall patterns could make some regions more prone to drought or floods. A more ambitious stabilization target might well be warranted, but we suggest this goal as an illustration of what might be an environmentally acceptable and practically achievable climate protection trajectory.

To achieve this goal, CO_2 concentrations would have to be stabilized at approximately 450 ppm, which is about 60 percent above pre-industrial concentrations. This would require keeping total global carbon emissions within a budget of 500 billion tons of carbon over the course of the 21st century, whereas a business-as-usual trajectory would have us emitting about 1,400 billion tons. Annual global carbon emissions from fossil fuels would have to be at least halved by the end of the century, from today's 6 billion tons/yr to less than 3 billion tons/yr, and deforestation would need to be halted, in contrast to a business-as-usual trajectory which grows to 20 billion tons/yr. With a growing global population, this implies a decrease in the annual per capita emissions from today's 1 ton to about 0.25 tons, whereas the business-as-usual per capita emissions grow to almost 2 tons. Figure 2.1, which shows these two radically different emissions trajectories, conveys the ambitiousness of this target.

Figure 2.1: Global carbon emissions from fossil fuel combustion (1890-2100) – Business-as-usual trajectory (IPCC IS92a scenario) and trajectory for climate stabilization at 450 ppm

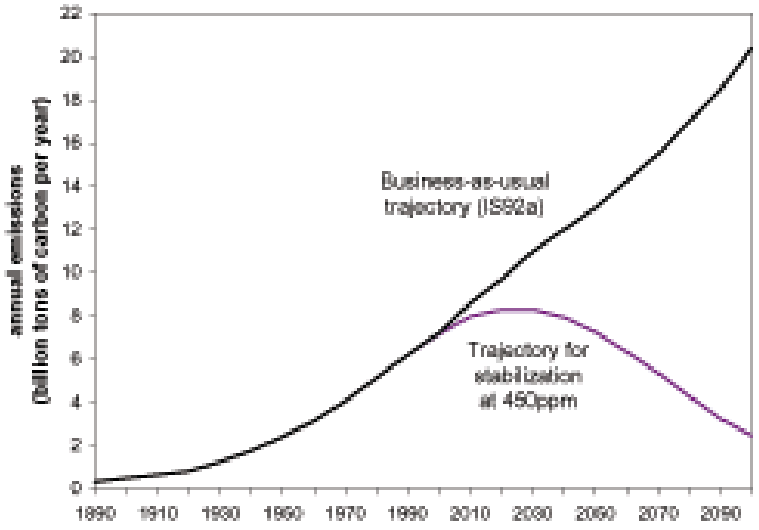


Figure 2.1: Global carbon emissions from fossil fuel combustion (1890–2100)—Business-as-usual trajectory (IPCC IS92a scenario) and trajectory for climate stabilization at 450 ppm

The industrialized countries are responsible for about two-thirds of global annual carbon, at more than 3 tons per-capita, with the United States at 5.5 tons per capita, while on average developing countries emit only 0.5 tons per capita. Even if emissions in the developing countries were to vanish instantly, implying a nightmarish devolution of their economies, the industrialized world would still need to almost halve its emissions in order to protect the climate.

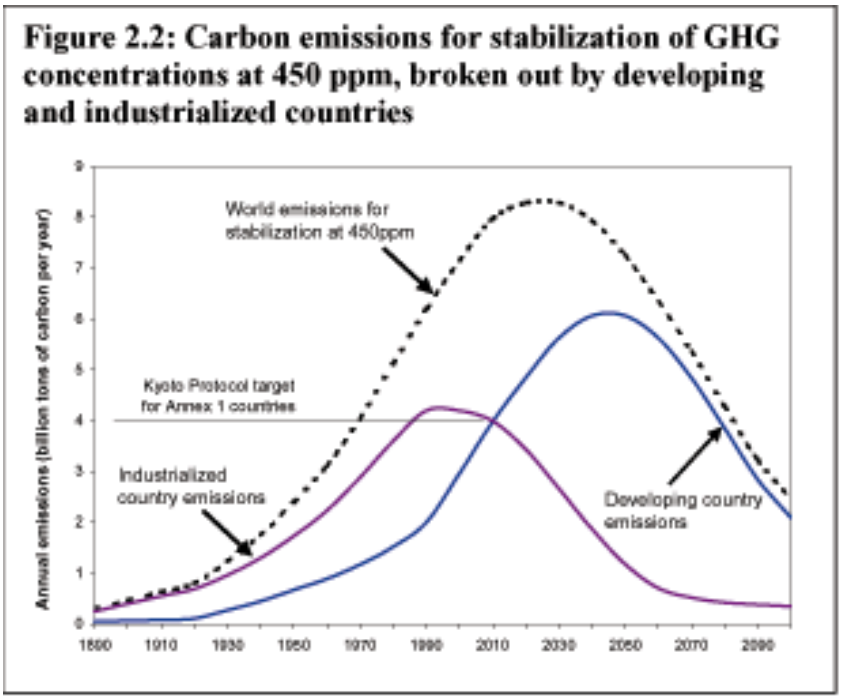


Figure 2.2: Carbon emissions for stabilization of GHG concentrations at 450 ppm, broken out by developing and industrialized countries

Figure 2.2 shows the global carbon trajectory for stabilization at 450 ppm, as shown in Figure 2.1, broken out into emission paths for both the industrialized and developing countries. In this illustrative allocation, emissions converge to equal per capita emissions (?0.25 tC per capita) by the end of the 21st century. Clearly, it is essential that the industrialized countries begin early and continue steadily to decrease their emissions on a trajectory to meet these climate protection requirements. Industrialized countries on the whole would have to roughly reduce their per capita emissions ten-fold, and the United States in particular would have to reduce by more than a factor of twenty.

Emissions from the developing countries could grow in the near term, as they undergo economic development and transition toward advanced, efficient and low-carbon technologies, and then decline rapidly during the latter half of the century. Ultimately, the developing countries would need to halve their per capita emissions relative to today's levels, notwithstanding the considerable economic growth that they are expected to realize over this century. This would involve economic development predicated upon use of energy technologies and energy resources that would entail a "leap-frogging" over the fossil-based economic development that has occurred in the industrialized countries directly to cleaner energy sources. Such a transition would require concerted technology and institutional cooperation, with associated financial assistance, among developing and industrialized countries.

Stabilization and equalization would thus be served by a dual technological transition in which the industrialized countries can take the lead, by demonstrating their commitment to addressing a problem for which it bears primary responsibility, and fostering the first wave of technological innovation from which both developing and industrialized countries could benefit.

The Kyoto Protocol

Although only a first small step, the Kyoto Protocol offers a pivotal opportunity to shift away from the climate-disrupting path down which the world is now headed, and onto a climate-protecting path. It is well understood that the Kyoto Protocol is the basis for future emissions reductions as well. If it enters into force, the Kyoto

Protocol will legally bind industrialized countries that ratify it to specific GHG reduction targets, to be attained during the during the 5 year "budget period" from 2008 to 2012. For the United States, the target is 7 percent less than the 1990 emission levels. The limit is 6 percent for Japan, 0 percent for Russia, and an average of 8 percent for the European Union countries. Across all industrialized countries, the emissions budget is 5 percent below 1990 emissions rate, whereas the business-as-usual emissions rate is projected to increase by approximately 20 percent by 2010.

The Kyoto Protocol offers a number of options to lower the cost of meeting their targets. Many of these so-called "flexibility mechanisms" were included at the request of the United States in Kyoto. They allow countries to carry out projects that reduce carbon emissions (or enhance carbon absorption) from biological stocks such as forests and possibly agricultural land, or can reduce emissions of GHGs other than carbon.[4] Countries can also undertake GHG mitigation projects in other countries[5] and acquire credits for the resulting reductions, or can simply purchase excess carbon allowances from countries that surpass their targets.[6]

However, these flexibility mechanisms should be implemented with caution, lest they undermine effectiveness of the Kyoto Protocol. Given its modest reduction targets relative to the much deeper reductions ultimately needed for climate protection, the main purpose of the Protocol is to reduce greenhouse gas emissions by launching a global transition in technologies and infrastructure for energy production and use. The first budget period should end with a decisive shift away from conventional energy investments, real progress in institutional learning and technological innovation, and momentum to deepen and expand these changes over the longer term. An over-reliance on the flexibility mechanisms may permit too slow a start, and too weak a signal, to motivate this fundamental transition.

Excessive use of the flexibility mechanisms could undermine the needed transition in several ways. First, the emissions trading system is in danger of being severely diluted by cheap carbon allowances from the Russian Federation and Ukraine, whose negotiated targets are far above the emission levels they will reach by 2010 even without reduction efforts. Second, inadequate rules for credits from project-based mechanisms could generate "free-rider" credits that reflect inflated estimates of their mitigation value, thereby undermining the Protocol's targets. Third, mitigation activities that rely on biological sequestration strain our current technical ability to reliably measure carbon changes, are based on uncertain science, and take pressure off of fossil fuel reduction. Perhaps more importantly, institutions are not yet in place to ensure that such projects do not harm biodiversity and human communities.

The attraction and rhetoric of solutions that lie outside the borders of the industrialized countries is misguided at this time. To be sure, there are important opportunities to help developing countries advance along a sustainable, low carbon path. But unfettered use overseas options, justified by lower short-term costs for the industrialized countries, would be a head-in-the-sand approach to the long-term responsibility of climate protection. The quantity of such offsets should be limited and their quality guaranteed. Procedures should be established to help ensure that the various flexibility mechanisms help protect the climate and advance sustainable development. These include consistency with local ecological, cultural, economic conditions and constraints, guaranteed public participation in project design, certification and review, strong ecological and social criteria, human and institutional capacity-building goals, strong and equitable relationships for technology cooperation, and acceptable procedures for monitoring, verification and accreditation of offset actions and transactions. Until then it is premature to rely on the CDM for more than a very small part of the required emissions reductions.

If the United States relies too heavily on the flexibility mechanisms, it could forego opportunities to reap the co-benefits of decreasing carbon emissions at home. These include the reduced health and ecological damages resulting from decreased emissions of mercury, fine particulates and other pollutants, and the improvements in technologies, skills and productivity accompanying deployment and use of more advanced technologies and practices. It could also find itself in a poorer position to meet the stricter emissions reduction commitments expected for subsequent budget

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[4]The GHGs that are covered by the Kyoto Protocol include carbon dioxide (CO_2), methane (CH4), nitrous oxide (N2O), hydrofluorocarbons (HFCs), perflourocarbons (PFCs), and sulfur hexaflouride (SF6).

[5]"Joint Implementation" (JI) is the relevant mechanism if the host country is an industrialized country with a target, and "Clean Development Mechanism" (CDM) if the host country is a developing country.

[6]Purchase of allowances is known as "Emissions Trading".

periods. The Nation could become a follower rather than a leader in advanced technologies in domestic and world markets. Thus, it could miss the opportunity provided by the Kyoto Protocol for a national technological and economic "renaissance" with cleaner energy, processes and products in the coming decades.

3. Policies

This study examines a broad set of national policies that would increase energy efficiency, accelerate the adoption of renewable energy technologies, and shift to less carbon-intensive fossil fuels. This policy package contrasts sharply with the Bush Administration's energy strategy, which heavily focuses on fossil fuels and lacks any significant effort to protect the climate. The policies address major areas of energy use in the buildings, industrial, transport, and electrical sectors. Analyses of the investment costs and energy savings of policies to promote energy efficiency and cogeneration in the residential, commercial, and industrial sectors were taken primarily from the American Council for an Energy Efficient Economy (1999; 2001).

Below we group these policies into the particular sector where they take effect, and describe the key assumptions made concerning the technological impacts of the individual policies. Unless otherwise indicated, each of the policies is assumed to start in 2003.

As explained further in the methodology discussion in the next section, we adapted the Energy Information Administration's 2001 Reference Case Forecast (EIA 2001) to create a slightly revised "base case." Our policies and assumptions build on those included in this base case forecast (i.e., we avoid taking credit for emissions reductions, costs, or savings already included in the EIA 2001 Reference Case). When taken together, the policies described in this section represent a Climate Protection Scenario that the United States could pursue to achieve significant carbon reductions.

3.1. Policies in the Buildings and Industrial Sectors

Carbon emissions from fuel combustion in the buildings (including both residential and commercial) sector account for about 10 percent of U.S. greenhouse gas emissions, while emissions from the industrial sector account for another 20 percent. When emissions associated with the electricity consumed are counted, these levels reaches over 35 percent for buildings and 30 percent for industry. We analyzed a set of policies that include new building codes, new appliance standards, tax incentives for the purchase of high efficiency products, a national public benefits fund, expanded research and development, voluntary agreements and support for combined heat and power.

Building codes

Building energy codes require all new residential and commercial buildings to be built to a minimum level of energy efficiency that is cost-effective and technically feasible. "Good practice" residential energy codes, defined as the 1992 (or a more recent) version of the Model Energy Code (now known as the International Energy Conservation Code), have been adopted by 32 States (BCAP 1999). "Good practice" commercial energy codes, defined as the ASHRAE 90.1 model standard, have been adopted by 29 States (BCAP 1999). However, the Energy Policy Act of 1992 (EPAct) requires all States to adopt a commercial building code that meets or exceeds ASHRAE 90.1, and requires all States to consider upgrading their residential code to meet or exceed the 1992 Model Energy Code.

This policy assumes that DOE enforces the commercial building code requirement in EPAct and that States comply. We also assume that relevant States upgrade their residential energy code to either the 1995 or 1998 Model Energy Code either voluntarily or through the adoption of a new Federal requirement. Furthermore, we assume that the model energy codes are significantly improved during the next decade and that all States adopt mandatory codes that go beyond current "good practice" by 2010. To quantify the impact of these changes, we assume a 20 percent energy savings in heating and cooling in buildings in half of new homes and commercial buildings.

New Appliance and Equipment Efficiency Standards

The track record for electricity efficiency standards is impressive, starting with the National Appliance Energy Conservation Act of 1987 and continuing through the various updates that were enacted in early 2001 for washers, water heaters, and central air conditioners. These standards have removed the most inefficient models from the market, while still leaving consumers with a diversity of products. An analysis of Department of Energy figures by the American Council for an Energy Efficient Economy, estimates nearly 8 percent of annual electricity consumption will be saved in 2020 due to standards already enacted (Geller et al. 2001). However, many

appliance efficiency standards haven't kept pace with either legal updating requirements or technological advances. The Department of Energy is many years behind its legal obligation to regularly upgrade standards for certain appliances to the "maximum level of energy efficiency that is technically feasible and economically justified."

In this study, we assume that the government upgrades existing standards or introduces new standards for several key appliances and equipment types: distribution transformers, commercial air conditioning systems, residential heating systems, commercial refrigerators, exit signs, traffic lights, torchiere lighting fixtures, ice makers, and standby power consumption for consumer electronics. We also assume the higher energy efficiency standards for residential central air conditioning and heat pumps than was allowed by the Bush Administration. These are all measures that can be taken in the near term, based on technologies that are available and costeffective.

Tax incentives

A wide range of advanced energy-efficient products have been proven and commercialized, but have not yet become firmly established in the marketplace. A major reason for this is that conventional technologies get "locked-in"; they benefit from economies of scale, consumer awareness and familiarity, and already existing infrastructure that make them more able to attract consumers, while alternatives are overlooked though they could be financially viable once mass-produced and widely demonstrated. Initial, temporary tax incentives can help usher advanced alternatives into the market place, which—once established—can proceed to gain significant market share without further subsidy.

In this study, we consider initial tax incentives for a number of products. For consumer appliances, we considered a tax incentive of $50 to $100 per unit. For new homes that are at least 30 percent more efficient that the Model Energy Code, we considered an incentive of up to $2,000 per home; for commercial buildings with at least 50 percent reduction in heating and cooling costs relative to applicable building codes, we applied an incentive equal to $2.25 per square foot. Regarding building equipment such as efficient furnaces, fuel cell power systems, gas-fired heat pumps, and electric heat pump water heaters, we considered a 20 percent investment tax credit. Each of these incentives would be introduced with a sunset clause, terminating them or phasing them out in approximately 5 years, so as to avoid their becoming permanent subsidies. Versions of all of the tax incentives considered here have already been introduced into bills before the Senate and/or House.[7]

National Public Benefits Fund

Electric utilities have historically funded programs to encourage more efficient energy-using equipment, assist low-income families with home weatherization, commercialize renewables, and undertake research and development (R&D). Such programs have typically achieved electricity bill savings for households and businesses that are roughly twice the program costs (Nadel and Kushler, 2000). Despite the proven effectiveness of such technologies and programs, increasing price competition and restructuring have caused utilities to reduce these "public benefit" expenditures over the past several years. In order to preserve such programs, 15 States have instituted public benefits funds that are financed by a small surcharge on all power delivered to consumers.

This study's policy package includes a national level public benefits fund (PBF) fashioned after the proposal introduced by Sen. Jeffords (S. 1369) and Rep. Pallone (H. 2569) in the the 106th Congress. The PBF would levy a surcharge of 0.2 cents per kilowatt-hour on all electricity sold, costing the typical residential consumer about $1 per month. This Federal fund would provide matching funds for States for approved public benefits expenditures. In this study, the PBF is allocated to several different programs directed at improvements in lighting, air conditioning, motors, and other cost-effective energy efficiency improvements in electricity-using equipment.

Expand Federal funding for Research and Development in Energy Efficient Technologies

Federal R&D funding for energy efficiency has been a spectacularly cost-effective investment. The DOE has estimated that the energy savings from 20 of its energy efficiency R&D programs has been roughly $30 billion so far—more than three times the Federal appropriation for the entire energy efficiency and renewables R&D

[7]The bills include those introduced by Senators Murkowski and Lott (S. 389); Bingaman and Daschle (S. 596), Smith (S. 207), Hatch (S. 760), and Representative Nussle (H.R. 1316).

budget throughout the 1990's (EERE, 2000). At a time when energy issues are in the forefront of the national debates, such R&D efforts should be increased and should be thought of as a remedy for the real energy crises engendered by continued fossil fuel dependence—climate change, environmental damage, and diminishing fossil fuel supplies.

Tremendous opportunities exist for further progress in material-processing technologies, manufacturing processing, electric motors, windows, building shells, lighting, heating/cooling systems, and super-insulation, for example. The EPA's Energy Star programs have also saved large amounts of energy, building on the achievements of R&D efforts and ushering efficient products into the marketplace. By certifying and labeling efficient lighting, office equipment, homes and offices, Energy Star has helped foster a market transformation toward much more efficient products and buildings. Currently, roughly 80 percent of personal computers, 95 percent of monitors, 99 percent of printers, and 65 percent of copiers sold are Energy Star certified (EPA, 2001; Brown et al, 2001). In light of these successes, EPA should be allocated the funds to broaden the scope of its Energy Star program, expanding to other products (refrigerators, motors) and building sectors (hotels, retailers), and the vast market of existing buildings that could be retrofitted. In this study, we assume that increased funding to expand research and development efforts in industry (e.g., motors) buildings (e.g., advanced heating/cooling), and transport (e.g., more fuel efficient cars and trucks) will lead to more energy-savings products becoming commercially available.

Industrial Energy Efficiency through Intensity Targets

There is remarkable quantity of untapped, cost-effective energy efficiency potential in today's industrial facilities (Elliott 1994), and some corporate managers have shown impressive initiative in moving to realize that potential. In 1995, Johnson and Johnson set a goal of reducing its energy costs 10 percent by 2000 through adoption of "best practices" in its 96 U.S. facilities. Building on this work, in 2000 Johnson & Johnson pledged to reduce global warming gases by 7 percent below 1990 levels by the year 2010, with an interim goal of 4 percent below 1990 levels by 2005.

In 1998, British Petroleum announced it would voluntarily reduce its carbon emissions to 10 percent below 1990 levels by 2010, representing almost a 40 percent reduction from projected emissions levels in 2010 given "business-as-usual" emissions growth (Romm 1999). And in September 1999, DuPont announced it would reduce its GHG emissions worldwide by 65 percent relative to 1990 levels, while holding total energy flat and increasing renewable energy resources to 10 percent of total energy inputs, by 2010. DuPont appears to be on track for achieving earlier commitments to reduce energy intensity 15 percent and total GHG emissions 50 percent, relative to 1990 levels, by 2000 (Romm 1999). Companies as diverse as Alcoa, Kodak, Polaroid, IBM and Royal Dutch Shell also find it cost-effective to establish worldwide greenhouse gas reduction targets. The practices these companies are developing make them better prepared for an economy that places a value on carbon reductions.

There is substantial potential for cost-effective efficiency improvement in both energy-intensive and non-energy intensive industries (Elliott 1994). For example, an in-depth analysis of 49 specific energy efficiency technologies for the iron and steel industry found a total cost-effective energy savings potential of 18 percent (Worrell, Martin, and Price 1999).

We consider in this study Federal initiatives to motivate and assist industry to identify and exploit energy efficiency opportunities. Government agencies can support industry by providing technical and financial assistance, and by expanding Federal R&D and demonstration programs.

In addition to these carrots, government may need to brandish a stick in order to induce a large fraction of industries to make serious energy efficiency commitments. If industry does not respond to the Federal initiatives at a level sufficient to meet certain energy efficiency targets, a mandatory, binding energy intensity standard should be triggered to ensure the required targets are attained.

Support for Cogeneration

Cogeneration (or, combined heat and power—CHP) is a super-efficient means of co-producing two energy-intensive products that are usually produced separately—heat and power. The technical and economical value of CHP has been widely demonstrated, and some European countries rely heavily on CHP for producing power and providing heat to industries, businesses, and households. The thermal energy produced in co-generation can also be used for (building and process) cooling or to provide mechanical power.

While CHP already provides about 9 percent of all electricity in the United States, there are considerable barriers to its wider cost-effective implementation (Elliott and Spurr, 1999). Environmental standards should be refined to recognize the greater overall efficiency of CHP systems, for example by assessing facility emissions on the basis of fuel input, rather than useful energy output. Non-uniform tax standards discourage CHP implementation in certain facilities. Moreover, utility practices are generally highly hostile to prospective CHP operators, through discriminatory pricing and burdensome technical requirements and costs for connecting to the grid.

In this study, we consider the impact of introducing policies that would establish a standard permitting process, uniform tax treatment, accurate environmental standards, and fair access to electricity consumers through the grid. Such measures would help to unleash a significant portion of the enormous potential for CHP. In this study we assumed 50 GW of new CHP capacity by 2010, and an additional 95 GW between 2011 and 2020. With electricity demand reduced by the various energy efficiency policies adopted in this study, co-generated electricity reaches 8 percent percent of total remaining electricity requirements in 2010 and 36 percent percent in 2020.

3.2. Policies in the Electric Sector

A major goal of U.S. energy and climate policy will be to dramatically reduce carbon and other pollutant emissions from the electric sector, which is responsible for more than one-third of all U.S. greenhouse gas emissions. We analyzed a set of policies in the electric sector that include standards and mechanisms to help overcome existing market barriers to investments in technologies that can reduce emissions. Three major policies—a renewable portfolio standard, a cap on pollutant emissions, and a carbon cap and trade system—were considered as described below.

Renewable Portfolio Standard

A Renewable Portfolio Standard (RPS) is a flexible, market-oriented policy for accelerating the introduction of renewable resources and technologies into the electric sector. An RPS sets a schedule for establishing a minimum amount of renewable electricity as a fraction of total generation, and requires each generator that sells electricity to meet the minimum either by producing that amount of renewable electricity in its mix or acquiring credits from generators that exceed the minimum. The market determines the portfolio of technologies and geographic distribution of facilities that meet the target at least cost. This is achieved by a trading system that awards credits to generators for producing renewable electricity and allows them to sell or purchase these credits. Thirteen States—Arizona, Connecticut, Hawaii, Iowa, Maine, Massachusetts, Minnesota, Nevada, New Jersey, New Mexico, Pennsylvania, Texas, and Wisconsin—already have RPSs, and Senator Jeffords introduced a bill in the 106th Congress (S. 1369) to establish a national RPS.

The RPS provides strong incentives for suppliers to design the lowest cost, most reliable renewable electricity projects, and to identify niche applications and consumers where the projects will have the greatest value. It also provides assurance and stability to renewable technology vendors, by guaranteeing markets for renewable power, allowing them to capture the financial and administrative advantages that come with planning in a more stable market environment. Yet it still maintains a competitive environment that encourages developers to innovate. Finally, by accelerating the deployment of renewable technologies and resources, the RPS also accelerates the learning and economies of scale that allow renewables to become increasingly competitive with conventional technologies. This is particularly important, as the demands of climate stabilization in coming decades will require more renewable energy than we can deploy in the next two decades.

In this study, we have applied an RPS that starts at a 2 percent requirement in 2002, grows to 10 percent in 2010, and to 20 percent in 2020, after all efficiency policies are included. Wind, solar, geothermal, biomass, and landfill gas are eligible renewable sources of electricity, but environmental concerns exclude municipal solid waste (owing to concerns about toxic emissions from waste-burning plants) and large-scale hydro (which also raises environmental concern and need not be treated as an emerging energy technology as it already supplies nearly 10 percent of the nation's electricity supply).

As a modest addition to the RPS we provide a subsidy to grid-connected solar photovoltaic electricity generation. The purpose of this subsidy is to introduce a small amount of this technology so that it can play a role in the generation mix, seeking to induce technology learning, performance improvement and scale economies, and ultimately increased fuel diversity and another zero emissions option for the longer term. The level is kept small so that costs and price impacts are minimal.

Tightening of SO_2 and NOx Emission Regulations

Acid rain and urban air pollution remain serious problems in the United States. The 1990 Clean Air Act Amendments attempted to address these problems, by introducing a cap-and-trade system to roughly halve the electric sector's SO_2 emissions by 2000, and imposing technology-specific standards for NOx emissions. Compliance with the SO_2 standard proved markedly cheaper than initially expected; initial estimates were mostly based on investments in "scrubbers" but the discovery of large low-sulfur coal reserves in the Wyoming basins and a sharp decline in the cost of rail transport resulted in lower costs.

Despite the improvements brought about by the Clean Air Act and its Amendments, recent studies have confirmed that SO_2 and NOx continue to harm lake and forest ecosystems, decrease agricultural productivity and affect public health through its damaging affects on urban air quality (Clean Air Task Force, 2000). The Clean Air Act only calls for minimal reductions in the cap by 2010 and no reductions after that.

In this study, we tighten the SO_2 cap so as to reduce sulfur emissions to roughly 40 percent of current levels by 2010 and one third of current levels by 2020. We also impose a cap-and-trade system on NOx emissions in the summertime, when NOx contributes more severely to photochemical smog. This system expands the current cap and trade program, which calls on 19 States to meet a target in 2003 that then remains constant, to include all States with a cap that is set first in 2003 but decreases in 2010, relative to 1999 levels. The cap results in a 25 percent reduction of annual NOx emissions by 2003, and a 50 percent reduction by 2010.

Carbon Cap-And-Trade Permit System

This study introduces a cap-and-trade system for carbon in the electric sector; with the cap set to achieve progressively more stringent targets over time, starting in 2003 at 2 percent below current levels, increasing to 12 percent below current by 2010 and 30 percent below by 2020. Restricting carbon emissions from electricity generation has important co-benefits, including reduced emissions of SO_2 and NOx, as discussed above, fine particulate matter, which is a known cause of respiratory ailments, and mercury, which is a powerful nervous system toxin and already contaminates over 50,000 lakes and streams in the United States. A progressively more stringent target also reduces demand for coal, and hence mining-related pollution of streams and degradation of landscapes and terrestrial habitats.

In the SO_2, NOx, and CO_2 trading systems, permits are distributed through an open auction, and the resulting revenues can be returned to households (e.g., through a tax reduction or as a rebate back to households). Recent analyses suggest that an auction is the most economically efficient way to distribute permits, meeting emissions caps at lower cost than allocations based on grandfather allowances or equal per kWh allowances (Burtraw, et al. 2001). Implementing such auctions for the electric sector will also clear the way for an economy-wide approach in future years based on auctioning. In this study, the price of auctioned carbon permits reaches $100 per metric ton carbon.

While not specifically targeted by the trading programs, the operators of the 850 old "grandfathered" coal plants built before the Clean Air Act of 1970, which emit 3–5 times as much pollution per unit of power generated than newer coal power plants, will likely retire these plants rather than face the cost of purchase the large amount of credits necessary to keep them running. When the Clean Air Act was adopted, it was expected that these dirty power plants would eventually be retired. However, utilities are continuing to operate these plants beyond their design life, and have in fact increased their output over the last decade. By subjecting these old plants to the same requirements as newer facilities, as has been done or is being considered in several States including Massachusetts and Texas, operators would be obliged to modernize the old plants or to retire them in favor of cleaner electric generation alternatives.

With a cap and trade system in place for CO_2, SOx and NOx, this scenario reduces multiple emissions from power plants, in a manner similar to that adopted in the Four Pollutant Bill currently before the House (H.R., 1256) and the Senate (S. 556). The reductions in these three pollutants are as deep as those imposed in the Four Pollutant bills, and are achieved within a comparable timeframe. (The Department of Energy's NEMS model unfortunately does not explicitly track mercury, making it impossible to compare the results of this study to the mercury requirement in the Four Pollutant Bill.[8])

[8]On December 15, 2000, the EPA announced that mercury emissions need to be reduced, and that regulations will be issued by 2004.

3.3. Policies in the Transport Sector

Another goal of U.S. energy and climate policy will be to reduce carbon emissions from the transport sector, which is responsible for about one-third of all U.S. greenhouse gas emissions. We analyzed a set of policies in the transportation sector that include improved efficiency (light duty vehicles, heavy duty trucks and aircraft), a full fuel-cycle GHG standard for motor fuels, measures to reduce road travel, and high speed rail.

Strengthened CAFE Standards

Today's cars are governed by fuel economy standards that were set in the mid-1970's. The efficiency gains made in meeting those standards have been entirely wiped out by increases in population and driving, as well as the trend toward gas-guzzling SUVs. When the fuel economy standards were implemented, light duty trucks only accounted for about 20 percent of vehicle sales. Light trucks now account for nearly 50 percent of new vehicle sales; this has brought down the overall fuel economy of the light duty vehicle fleet, which now stands at its lowest average fuel economy since 1981. If the fuel economy of new vehicles had held at 1981 levels rather than tipping downward, American vehicle owners would be importing half a million fewer barrels of oil each day.

We introduce in this study a strengthened Corporate Average Fuel Economy standard for cars and light trucks, along with complementary market incentive programs. Specifically, fuel economy standards for new cars and light trucks rise from EIA's projected 25.2 mpg for 2001 to 36.5 mpg in 2010, continuing to 50.5 mpg by 2020. This increase in vehicle fuel economy would save by 2020 approximately twice as much oil as could be pumped from Arctic National Wildlife Refuge oil field over its entire 50-year lifespan (USGS, 2001).[9] Based on assessments of near-term technologies for conventional vehicles, and advanced vehicle technologies for the longer-term, we estimate that the 2010 CAFE target can be met with an incremental vehicle cost of approximately $855, and the 2020 CAFE target with an incremental cost of $1,900. To put these incremental costs in perspective, they are two to three times less than the fuel savings at the gasoline pump over the vehicle's lifetime.[10]

Improving Efficiency of Freight Transport

We also consider policies to improve fuel economy for heavy duty truck freight transport, which accounts for approximately 16 percent of all transport energy consumption. A variety of improvements such as advanced diesel engines, drag reduction, rolling resistance, load reduction strategies, and low friction drivetrains offer opportunities to increase the fuel economy of freight trucks. Many of these technologies are available today while other technologies like advanced diesel and turbine engines have been technically demonstrated but are not yet commercially available.

To accelerate the improvement in heavy duty truck efficiency, we have considered measures that expand R&D for heavy duty diesel technology, vehicle labeling and promotion, financial incentives to stimulate the introduction of new technologies, efficiency standards for medium- and heavy-duty trucks, and fuel taxes and user-fees calibrated to eliminate the existing subsidies for freight trucking. Together, it is estimated that these policies could bring about a fuel economy improvement of 6 percent by 2010, and 23 percent by 2020, relative to today's trucks.

Improving Efficiency of Air Travel

Air travel is the quickest growing mode of travel, and far more energy intensive than vehicle travel. One passenger mile of air travel today requires about 1.7 times as much fuel as vehicle travel.[11] We consider here policies for improving the efficiency of air travel, including R&D in efficient aircraft technologies, fuel consumption standards, and a revamping of policies that subsidize air travel through public investments.

We assume that air travel efficiency improves by 23 percent by 2010, and 53 percent by 2020. This is in contrast to the Base Case where efficiency increases by 9 percent by 2010 and 15 percent by 2020, owing to a combination of aircraft efficiency improvements (advanced engine types, lightweight composite materials, and advanced aerodynamics), increased load factor, and acceleration of air traffic management improvements (Lee et el, 2001; OTA, 1994; Interlaboratory Working Group, 2000). While we assume that air travel can reach 82 seat-miles per gallon by 2020

[9]Assuming a mean value at a market price of oil of $20/barrel.

[10]Assuming a retail price of gasoline of $1.50/gallon, a 10-year life of the vehicle, and 12,000 miles per year.

[11]Assuming typical load factors of 0.33 for autos and 0.6 for air.

from its current 51, it is technologically possible that far greater efficiencies approaching 150 seatmiles/gal could be achieved, if not in that time period then over the longer term. (Alliance to Save Energy et al, 1991).

Greenhouse Gas Standards for Motor Fuels

Transportation in the United States relies overwhelmingly on petroleum-based fuels, making it a major source of GHG emissions. We introduce here a full fuel-cycle GHG standard for motor fuels, similar in concept to the RPS for the electric sector. The standard is a cap on the average GHG emissions from gasoline, and would be made progressively more stringent over time. Fuel suppliers would have the flexibility to meet the standard on their own or by buying tradable credits from other producers of renewable or low-GHG fuel.

The policy adopted in this study requires a 3 percent reduction in the average national GHG emission factor of fuels used in light duty vehicles in 2010, increasing to a 7 percent reduction by 2020. The policy would be complemented by expanded R&D, market creation programs, and financial incentives. Such a program would stimulate the production of low-GHG fuels such as cellulosic ethanol and biomass- or solar-based hydrogen.

For this modeling study, we assume that most of the low-GHG fuel is provided as cellulosic ethanol, which can be produced from agricultural residues, forest and mill wastes, urban wood wastes, and short rotation woody crops (Walsh et al 1998; Walsh, 1999). As cellulosic ethanol can be co-produced along with electricity, in this study we assume that electricity output reaches 10 percent of ethanol output by 2010 and 40 percent by 2020 (Lynd, 1997). Due to the accelerated development of the production technology for cellulosic ethanol, we estimate that the price falls to $1.4 per gallon of gasoline equivalent by 2010 and remains at that price thereafter (Interlaboratory Working Group, 2000).

Improving Alternative Modes to reduce Vehicle Miles Traveled

The amount of travel in cars and light duty trucks continues to grow due to increasing population and low vehicle occupancy. Between 1999 and 2020, the rate of growth in vehicle miles traveled is projected to increase in the Base Case by about 2 percent per year. The overall efficiency of the passenger transportation system can be significantly improved through measures that contain the growth in vehicle miles traveled through land-use and infrastructure investments and pricing reforms to remove implicit subsidies for cars, which are very energy intensive.

We assume that these measures will primarily affect urban passenger transportation and result in a shift to higher occupancy vehicles, including carpooling, vanpooling, public transportation, and telecommuting. We consider that the level of reductions of vehicle miles traveled that can be achieved by these measures relative to the Base Case are 8 percent by 2010 and 11 percent by 2020.

High Speed Rail

High speed rail offers an attractive alternative to intercity vehicle travel and short distance air travel. In both energy cost and travel time, high speed rail may be competitive with air travel for trips of roughly 600 miles or less, which account for about one-third of domestic air passenger miles traveled. Investments in rail facilities for key inter-city routes (such as the Northeast corridor between Washington and Boston, the East cost of Florida between Miami and Tampa, and the route linking Los Angeles and San Francisco) could provide an acceptable alternative and reduce air travel in some of the busiest flight corridors (USDOT, 1997).

High speed rail can achieve practical operating speeds of up to 200 mph. Prominent examples include the French TGV, the Japanese Shinkansen, and the German Intercity Express. An emerging advanced transport technology is the maglev system in which magnetic forces lift and guide a vehicle over a specially designed guideway. Both Germany and Japan are active developers of this technology.

In this analysis we have taken the DOT's recent estimates of the potential high speed rail ridership which, based on projected mode shifts from air and automobile travel in several major corridors of the United States, reaches about 2 billion passenger miles by 2020 (DOT, 1997). While this level of HRS ridership provides relatively small energy and carbon benefits by 2020, it can be viewed as the first phase of a longer-term transition to far greater ridership and more advanced, faster and efficient electric and MAGLEV systems in the ensuing decades.

4. Methods and Assumptions

The modeling for this study was based primarily on the National Energy Modeling System (NEMS) of the U.S. Department of Energy, Energy Information Administration (DOE/EIA) (EIA, 2001). The NEMS model version, data and assumptions employed in this study were those of EIA's Annual Energy Outlook (EIA 2001), which

also formed the basis for the Base Case. We refined the NEMS model with advice from EIA, based on their ongoing model improvements, and drawing on expert advice from colleagues at ACEEE and the Union of Concerned Scientists, the National Laboratories and elsewhere.[12]

The NEMS model takes account of the interactions between electricity supply and demand (aggregated residential, commercial and industrial), taking account of the mix of competitive and still regulated pricing in the United States. It accounts for the feedback effects between electricity market and power plant construction decisions, as well as the links between fuel demands, supplies and prices.

Our use of NEMS for this project focused on the Electricity Market Module (EMM), complemented by the Oil and Gas Supply Module (OGSM). The EMM starts with the detailed fleet of existing power plants in the 13 electric sector regions of the U.S, and also represents power imports from neighboring Canadian regions. It makes dispatch, construction, interregional purchase and retirement decisions based upon the regional electricity demands and the cost and performance characteristics of existing and new electric supply options, adhering to national pollutant caps and any State-level RPS requirements. It also takes account of cost reductions of new power plants with increased units in operation (learning and scale economies). The OGSM tracks changes in prices of natural gas and petroleum fuels based on changes in their demand.

Analyses of the costs and demand impacts of policies to promote energy efficiency and cogeneration in the residential, commercial, and industrial sectors were taken primarily from American Council for an Energy Efficient Economy (ACEEE, 1999; ACEEE, 2001). The electric generation, fuel, emissions and monetary savings from these policies were obtained using NEMS, to take account of all of the interactive and feedback effects described above. NEMS was used also to obtain the interactive effects of the policies affecting electricity demand and those, such as renewable, carbon and emission standards, which affect the electricity supply mix.

For example, we used information from ACEEE to lower the fuel and electricity demand within NEMS based on policies in the demand sectors. We ran NEMS to determine the new mix of electricity generation (based on changes in both electricity demand and the electricity sector policies). This resulted in decreased demand for oil and gas, leading to lower prices. NEMS iterates internally between energy supply and demand to seek a consistent solution.

Analyses of the policy impacts in the transportation sector took account of vehicle stock turnover, fuel-efficiencies and travel indices, and were benchmarked to the structure, data and baseline projections of the AEO_2001. Following assumptions for light duty vehicle efficiency in ACEEE (2001) and other sources (DeCicco, Ross and An, 2001), we accounted for both autonomous and policy-induced vehicle efficiency improvement, shifts between transport modes, and changes in demand for transport services.

5. Results

Carbon dioxide emissions in the United States have been rising over the past decade, and now exceed by more than 15 percent the 1990 emission rate of 1338 MtC/yr (EIA, 2001b). The U.S. Department of Energy (EIA, 2001a) business-as-usual scenario projects that these emissions will to continue to rise to 1808 MtC/yr in 2010—a 35 percent increase above 1990 levels. This is in stark contrast to the emissions limit that the United States negotiated at Kyoto—a 7 percent decrease below 1990 levels.

5.1. Overview of Results

Table 5.1 provides summary results on overall energy and carbon impacts, pollutant emissions impacts, and economic impacts for the Base and Climate Protection cases for 2010 and 2020. The portfolio of carbon-reducing policies and measures composed for this Climate Protection scenario brings the United States a long way toward meeting its Kyoto target, reducing carbon emissions from today's level to 1372 MtC/yr by 2010—but still 2.5 percent above 1990 levels. Reductions continue beyond 2010, and national emissions are reduced to 1087 MtC/yr in 2020, well below 1990 levels.

[12]More detailed discussions of the approach taken for sectoral policy analyses upon which this study was based can be found in Energy Innovations (EI 1997), the Energy Policy, Special Issue on Climate Strategy for the United States (1998), and Bernow et al. (1998 and 1999).

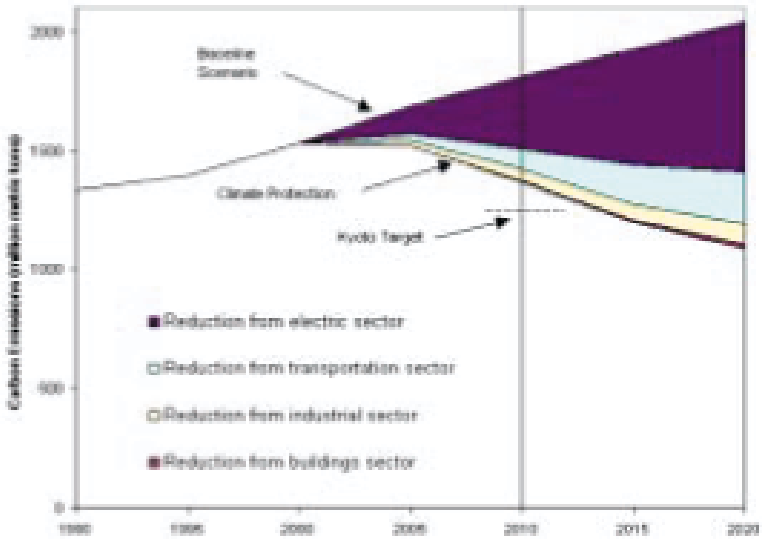
Table 5.1 Summary of results.

	1990[13]	2010 Base Case	2010 Climate Protection	2020 Base Case	2020 Climate Protection
End-use Energy (Quads)	63.9	86.0	76.4	97.2	72.6
Primary Energy (Quads)	84.6	114.1	101.2	127.0	89.4
Renewable Energy (Quads)					
Non-Hydro	3.5	5.0	10.4	5.5	11.0
Hydro	3.0	3.1	3.1	3.1	3.1
Net GHG Emissions (MtCe/yr)	1,648	2,204	1,533	—	——
Energy Carbon	1,338	1,808	1,372	2,042	1,087
Land-based Carbon	—	—	−58	—	——
Non-CO_2 Gases	310	397	279	—	——
International Trade	—	—	−60	—	——
Net Savings[14].					
Cumulative present value (billion $)	—	—	$105	—	$576
Levelized annual (billion $/year)	—	—	$13	—	$49
Levelized annual per household ($/year)	—	—	$113	—	$375

[13] Under Kyoto, the base year for three of the non-CO_2 GHGs (HFCs, PFCs, SF6) is 1995, not 1990, and the 1995 levels for these emissions are reported here.

[14] Savings are in 1999 $. The 2010 savings include $2.3 billion costs per year ($9 billion cumulative through 2010) of non-energy related measures needed to meet the Kyoto target. Costs are not included in 2020 since these measures policies do not extend past 2010.

Figure 5.1 Carbon emissions
a) Reductions by source of emissions



Overall, the national policies and measures were estimated to achieve an 11 percent reduction in primary energy use by 2010, and a nearly 30 percent reduction by 2020, while maintaining the same level of energy services to consumers. The use of renewable energy is doubled in 2010 relative to the Base case and remains roughly at that level through 2020.[15] The policies would also produce reductions in air

[15] This takes account of the percentage levels required by the Jeffords Bill for the electric sector (10 percent renewables by 2010, and 20 percent by 2020). However, when this RPS is com-

Continued

pollutant emissions owing to reduced fossil fuel consumption and greater use of renewable energy. This is most evident for SO_2 for which 2010 levels in the Climate Protection case are almost half of Base case levels, due in great part to the effect of the more stringent cap in the electric sector.

The analysis showed that national savings in energy bills would exceed the net incremental investments in more efficient technologies and expenditures for low carbon fuels. By 2010, the average savings exceed the additional costs of new equipment by $13 billion per year, or nearly $113 per household.

5.2. Sectoral Impacts

Figures 5.1a and 5.1b compare the carbon trajectories for the Base and Climate Protection scenarios, and shows the carbon reductions obtained by the policies to reduce energy-related carbon emissions. Carbon emissions reductions can be reported by where they are emitted (i.e., by source, 5.1a) or by the sectors to which the policies are directed (i.e., by policy, 5.1b).

Thus, for example: the refinery emissions reductions owing to decreased transportation oil use are attributed to the transport policies, while the refinery emissions reductions owing to decreased industrial oil use are attributed to the industrial policies; the electric generation emissions reductions and emissions increased onsite fuel use, owing to increased CHP are attributed to the industrial policies.

The first graph, Figure 5.1a, shows the emissions reductions in the sectors of their origin, that is, in which the combustion of fossil fuels occurs. Thus, it shows emissions from onsite fossil fuel combustion in buildings, industry, transportation and electricity production. The largest reductions arise in the electric sector, owing to the enduse energy efficiency policies that reduce demand, plus the emissions and renewables policies for power supply that change the generation mix for electricity generation. Figure 5.1b shows the reductions from the various sectoral policies.

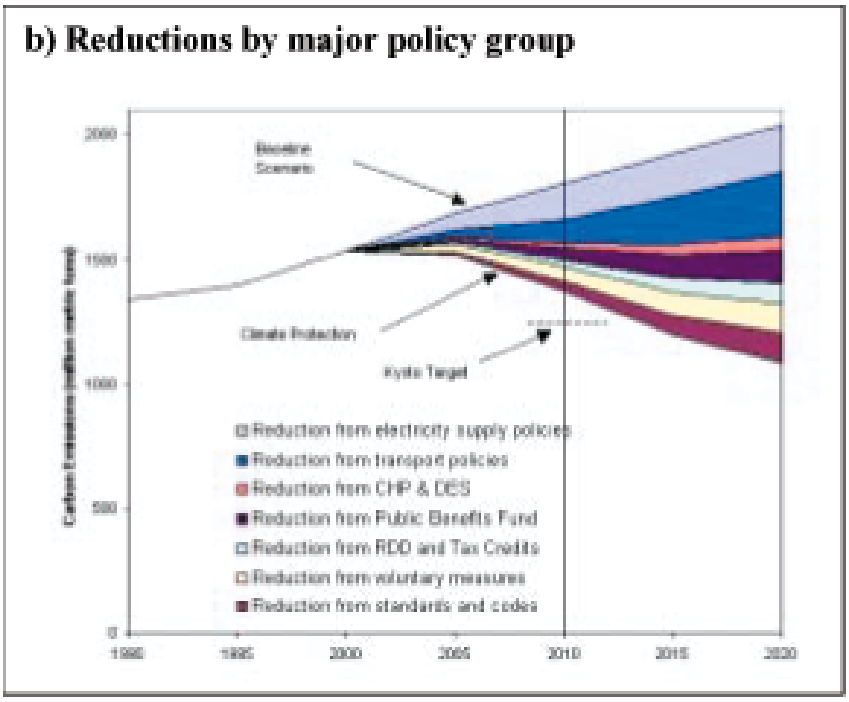


Table 5.2 summarizes the cost of saved carbon for each policy for 2010 and 2020. These costs were computed by summing the incremental annualized capital costs, administrative costs, incremental O&M and fuel costs, and subtracting O&M and

bined with the strong energy efficiency policies of this study, the absolute amount of renewables in the electric sector does not increase substantially between 2010 and 2020 because the percentage targets have already been met. A more aggressive renewables policy for the 2010–2020 period could be considered (ACEEE, 1999).

fuel cost savings. A 5-percent discount rate was used for both costs and carbon emissions.[16] Overall, the cost of saved carbon for the Climate Protection policy package results in net savings of $115/tC in 2010, and $576/tC in 2010. The net savings for the demand policies more than offset the incremental costs of saved carbon for the electric supply policies. Details regarding the impact of the policies within the sectors are summarized in the following sections.

Building and Industrial Sectors

The efficiency improvements in residential and commercial buildings, induced through enhanced building codes, strengthened standards for appliances and equipment, tax incentives, as well as policies to encourage CHP, leads to a decrease in net electricity usage of 19 percent by 2010 and nearly 50 percent by 2020. Despite the additional natural gas required to fuel CHP in buildings, onsite fuel use declines by 3 percent in 2010 and 10 percent in 2020, relative to the Base case. The net impact is a decline in carbon emissions by nearly one-third in 2010, and two-thirds by 2020, relative to the Base case.

Industrial energy efficiency measures undertaken largely through voluntary measures and tax incentives, cause the industrial sector to reduce it's direct energy consumption by 9 percent in 2010 and 14 percent in 2020 in the Climate Protection case relative to the Base case. In addition, largely because of the aggressive introduction of cogeneration, net electricity consumption is lower dramatically, by 30 percent in 2010 and 70 percent in 2020. The combined impact of these is that carbon emissions due to the industrial sector are lower by 26 percent in 2010 and 46 percent in 2020, relative to the Base case.

Table 5.2. Carbon reductions, net costs, and cost per saved carbon in 2010 and 2020

	2010			2020		
	Carbon Savings MtC/yr	Cumulative Net Cost (present value) billion (1999)$	Cost of saved carbon (1999)$ per tC	Carbon Savings MtC/yr	Cumulative Net Cost (present value) billion (1999)$	Cost of saved carbon (1999)$ per tC
Buildings & Industry Sectors						
Appliance standards	29	−$24	−$315	45	−$84	−$256
Building Codes	7	−$5	−$353	13	−$23	−$244
Voluntary measures	61	−$50	−$229	78	−$112	−$179
Research and design	21	−$18	−$257	37	−$53	−$186
Public Benefits Fund	50	−$29	−$224	73	−$101	−$187
Tax Credits	4	−$4	−$292	7	−$8	−$152
CHP and DES	21	−$53	−$611	33	−$151	−$554,
Subtotal	193	−$183	−$301	285	−$533	−$121
Electric Sector						
RPS						
NOx/SO_2 Cap and Trade						
Carbon trading	see below	.....	.....	see below		
Subtotal	147	$140	$258	180	$258	$188
Transport Sector						
Travel Reductions	29	−$50	−$496	37	−$126	−$495
LDV efficiency improvements	38	−$19	−$270	136	−$149	−$296
HDV efficiency improvements	8	−$3	−$179	33	−$22	−$214
Aircraft efficiency improvements	10	−$3	−$106	28	−$14	−$129
Greenhouse Gas Standards	11	$4	$136	22	$11	$99,
Subtotal	95	−$71	−$283	255	−$301	−$279,
TOTAL	436	−$114	−$82	721	−$576	−$124

Across both sectors, the policies result in combined fuel and electricity savings of 9.6 quads in 2010 and 24.6 quads by 2020. The cumulative investment in efficiency measures to achieve these savings is $80 billion by 2010 and $365 billion by 2020 (discounted 1999$).

[16]Carbon emissions are discounted based on the presumption that they will have a commodity value within some form of tradable permits regime.

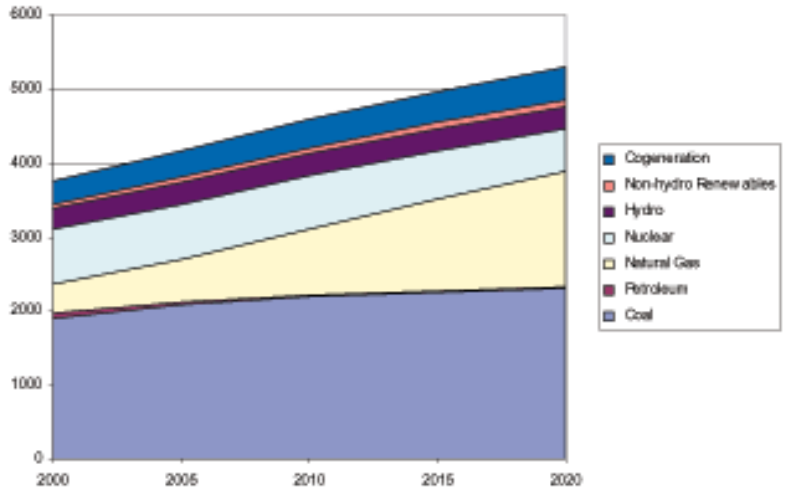
Electric Sector

The policies in the buildings and industrial sectors lead to major reductions in the total amount of electricity required from the nation's power stations. This impact is illustrated in Figure 5.2a and shows that energy efficiency measures entirely displace growth in electricity demand after 2005. Relative to today's level, electricity demand declines 15 percent by 2010 and 35 percent by 2020.

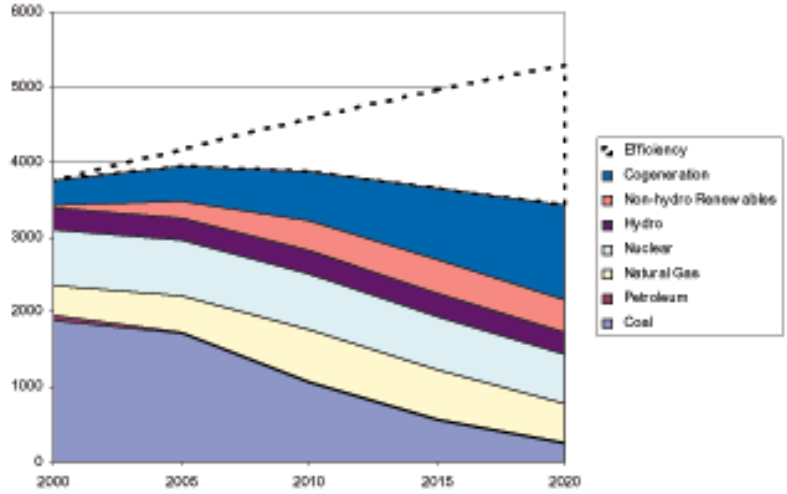
In addition to this reduced demand for electricity, the mix of fuels used to generate electricity changes dramatically, as shown in Figure 5.2b. The electric sector policies shift the generation mix away from a heavy reliance on coal, and avoid the rapid buildup of natural gas generation, by relying much more on renewable energy and, especially, cogeneration. Cogeneration grows from roughly 300 TWh today to 660 TWh in 2010, and 1260 in 2020, whereas in the Base case cogeneration increases modestly to 380 TWh in 2010 and 440 TWh in 2020. Non-hydro renewable energy consumption increases almost five times by 2010 over the Base case, and remains roughly at this level through 2020.

While effective at reducing carbon emissions, the electric sector policies do so at a net economic cost, increasing the average unit cost of electricity by about 2 cents / kWh in 2010. This effect diminishes over time as the electric sector is able to respond to the new policies and electricity demand reductions lead to fewer new power plants; by 2020, the electricity price is only about 1 cent / kWh higher than the base case. This price increase primarily reflects the fact that continued operation of existing coal plants, and construction and operation of new ones, remain economically attractive in the emerging price competitive restructured industry. In part, this is because the use of coal for electricity generation doesn't include environmental externalities.

Figures 5.2. Generation mix in (TWh)
(a) in the *Base* case



(b) in the *Climate Protection* case



By 2010, a total of 4.3 quads of fossil fuel reductions are achieved at power stations, and 6.5 quads by 2020. The cumulative investment to achieve these savings and greater utilization of renewable energy is $166 billion by 2010 and $333 billion by 2020 (discounted 1999$). Although the costs per unit of electricity increase, measures for demand-side efficiency lead to an overall decrease in endusers' electricity bills, and in the overall costs of electricity services.

Transportation

The vehicle efficiency and transportation demand management initiatives in the Climate Protection case result in energy savings of 4.6 quads in 2010, and 12.6

quads by 2020 (12 percent in 2010 and 28 percent in 2020, respectively, relative to the Base case). Carbon emissions fall slightly more relative to the base case (13 percent in 2010 and 31 percent in 2020) due to the small shift to less carbon-intensive fuels (specifically, cellulosic ethanol). By 2010, ethanol is contributing about 2 percent of transport fuel demand, and 4 percent in 2020. As in other biomass-intensive industries, this enables the co-production of electricity, thereby increasing the carbon benefits of this measure to the extent that it displaces fossil-fuel derived electricity. Reduced fuel production also adds to the carbon benefits, because it reduces emissions from refineries.

The cumulative investment to achieve these savings and greater utilization of renewable energy is $52 billion by 2010 and $213 billion by 2020 (discounted 1999$). The transport efficiency measures result in net savings, because fuel cost savings offset the slight increase in investment costs. These net savings more than offset the cost of the transportation fuel carbon content standard—which is the only net-cost transportation policy considered here. The overall net economic benefit achieved by the entire set of transportation policies provides an opportunity to pursue the carbon content standard, which begins a process of progressive technological improvement that is a critical element of obtaining the much deeper carbon emissions reductions in the transport sector needed later.

5.3. Air Pollution Reductions

A variety of air pollutants, associated with the use of fossil fuels, can cause or exacerbate health problems and damage the environment. Reducing use of fossil fuels would reap important local health benefits by lowering the amount of air pollutants inhaled. Recent scientific findings confirm that pollutants such as fine particulates, carbon monoxide, ozone (formed by a mix of volatile organic compounds and nitrogen oxides in presence of sunlight) can lead to health damages, including premature death. Research shows that small children and the elderly are particularly at risk from these emissions (Dockery et al., 1993; Schwartz and Dockery, 1992).

The policies would reduce national, regional and local pollution, owing to reduced fossil fuel use, providing important environmental benefits and health benefits, especially for small children and the elderly. Table 5.3 summarizes the impacts of the policies on criteria air pollutant emissions. Sulfur-dioxide emissions are about 52 percent lower in 2010 than the Base case, and about 68 percent below 1990 levels. Nitrogen oxides are 16 percent lower in 2010, and about 37 percent below 1990 levels. Particulates are about 13 percent lower in 2010, and about 24 percent below 1990 levels. Carbon monoxide emissions are about 9 percent lower in 2010, and about 2 percent below 1990 levels. Finally, volatile organic compounds are about 7 percent lower in 2010, and about 33 percent below 1990 levels.

Table 5.3: Impact of policies on air pollutant emissions

		2010 Base Case	2010 Climate Protection	2020 Base Case	2020 Climate Protection
CO	65.1	69.8	63.8	71.8	59.8
NOx	21.9	16.5	13.9	16.9	12.0
SO_2	19.3	12.8	6.2	12.7	3.3
VOC	7.7	5.5	5.1	5.9	4.9
PM_{10}	1.7	1.5	1.3	1.6	1.3

Figure 5.3 shows the impacts of the Climate Protection policies over time. The large reductions in particulates emissions arise from the substantial decrease in coal generation in the policy cases. Sulfur-dioxide decreases in the baseline projections arising from the cap/trade provisions of the 1990 Clean Air Act Amendments, are augmented by the policies. Similarly, baseline declines in nitrogen oxides, volatile organic compounds and carbon monoxide, which arise from tailpipe emissions standards as new cars enter the fleet, are augmented by the policies that affect vehicle travel patterns.

The reductions in nitrogen, sulfur, and carbon are similar to those introduced in the Four Pollutant Bill currently before the House and the Senate. The Climate Protection scenario achieves the required levels of reduction a few years earlier (for carbon) or later (for nitrogen and sulfur) than the Four Pollutant Bill's 2007 target date, with substantially deeper reductions continuing thereafter.

5.4. Economic Impacts

The portfolio of policies and measures considered here is a very aggressive package that goes a long way toward meeting the U.S. Kyoto Protocol obligation and continues to reduce emissions beyond the initial target period. Despite the ambitiousness of this package and the impressive carbon impacts, it would bring net economic benefits to the United States.

Figure 5.4 shows the benefits and costs at similar levels up to 2010 but benefits significantly outpacing costs in later years, reflecting in part the longer term benefits of reduced costs as new technologies are commercialized and as the system adjusts to the new policies. The costs derive from additional investments in more efficient lighting, high efficiency motors, more efficient automobiles, and other technologies that reduce the reliance on high carbon fuels. The savings derive from the avoided fuel costs. Both the additional investment and the net savings create additional income and jobs in the industries and services (and their suppliers) in which these funds are spent.

Figures 5.5 (demand side policies) and 5.6 (supply side policies) provide additional details regarding the costs effectiveness of the policies in 2010 and 2020. These figure indicate the allocation of costs and benefits between equipment investments and fuel savings and between demand and supply sectors. The policies in the demand sector, where large savings exist for energy efficiency measures, are very cost-effective, and yield substantial net benefits. Fuel and O&M savings are over 3 times the investment costs the in 2010 and about two and half times in 2020, yielding cumulative discounted net benefits of $259 billion and $844 billion, respectively, in those years.

Figure 5.3: Emissions of Major Air Pollutants: 1999-2020

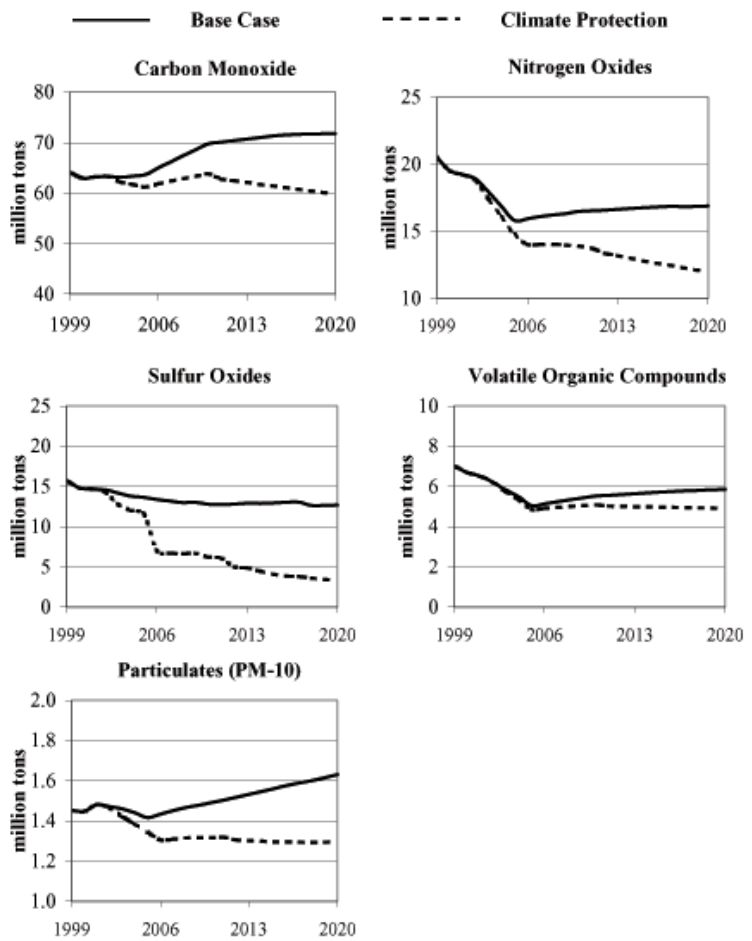
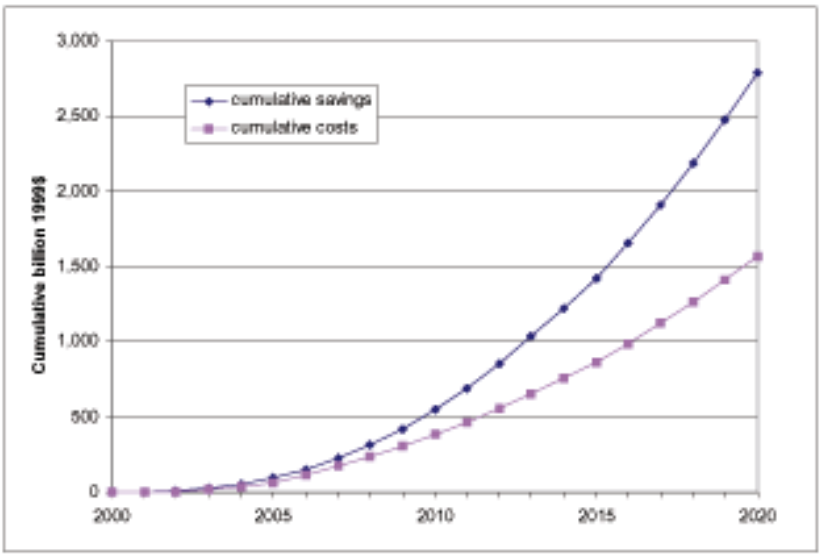
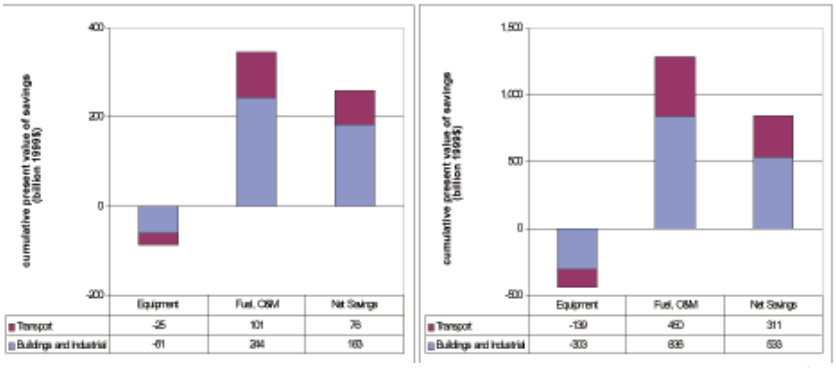


Figure 5.4. Cumulative undiscounted costs and savings from all policies and measures (1999$)



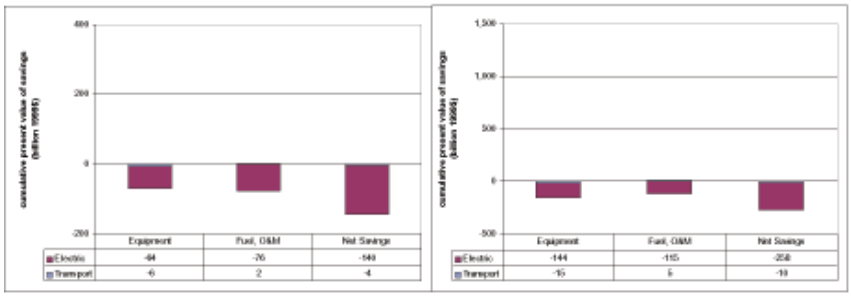
On the other hand, the supply sector policies are not cost-effective on their own and result in net costs. These costs, in capital, fuel, and O&M, are due to moving from coal generation to cleaner fuels like renewables and natural gas. The result is that cumulative discounted net costs for electric sector policies reach of $144 billion in 2010 and $268 billion in 2020.

Figure 5.5: Cost-effectiveness of demand policies in 2010 and 2020



When all policies are combined, the cumulative savings exceed the costs by $114 billion in 2010, and by 2020 the net benefits amount to approximately $576 billion. While the savings estimated here are significant, they are relatively small in comparison to overall economic activity. For instance, the annual net savings in 2010 of $48 billion is a small fraction of the $13.2 trillion projected GDP in that year.

Figure 5.6: Cost-effectiveness of supply policies in 2010 and 2020



6. Achieving Kyoto

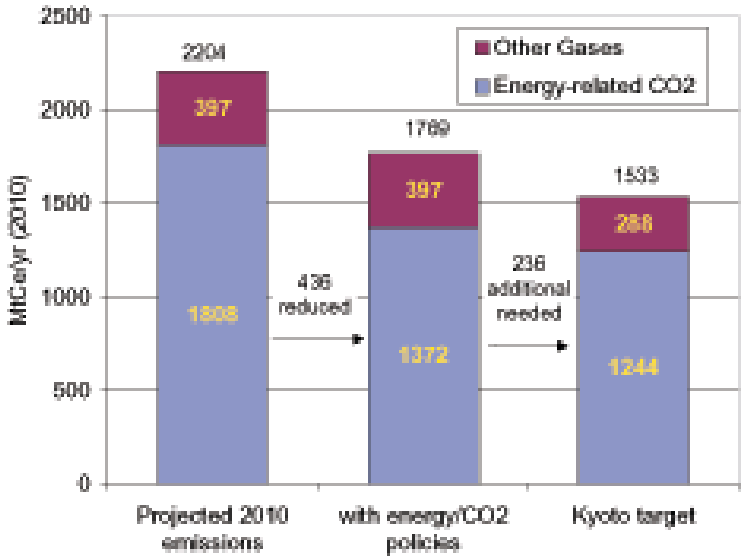
The foregoing analysis addressed policies to curb emissions of carbon dioxide from energy use in the U.S. Energy-related CO_2 emissions are the predominant source of U.S. greenhouse gas emissions for the foreseeable future, and their reduction is the central and ultimate challenge for protecting the climate. However, because of its delayed and weak emissions mitigation policies heretofore, and delayed ratification of the Kyoto Protocol, the United States may not be able to rely solely on energy sector policies and technologies to meet its Kyoto obligation of emissions 7 percent reduction below 1990 levels with no net economic cost. As our analysis has shown, such efforts, if aggressively pursued, would slow our growth in energy sector CO_2 emissions from a projected 35 percent to 2.5 percent above 1990 levels by 2010 and still achieve a small net economic benefit. This would be a major accomplishment, but would still leave us 128 MtC/yr short of achieving a target of 1244 MtC/yr by 2010, if the Kyoto target were confined only to the domestic energy sector. A tighter carbon cap for the electric sector could increase domestic energy-related emission reductions to meet the Kyoto requirement, but this would incur incremental costs that could eliminate the net benefit and lead to a modest overall net cost.

Of course, there is more to the Kyoto agreement. The Kyoto targets cover six gases—methane (CH4), nitrous oxide (N2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), sulfur hexafluoride (SF6) and carbon dioxide (CO_2) . The use of these gases is currently growing, due to the ongoing substitution of ozone depleting substances (ODS) with HFCs, and to a lesser extent, to growth in CH4 emissions from livestock and coal and natural gas systems, in N20 from fertilizer use, and in PFC emissions from semiconductor manufacture (EPA, 2000).

The U.S. commitment requires emissions of all six gases, in aggregate, to be reduced to 7 percent below their baseline levels.[17] When all of the six "Kyoto gases" are considered, baseyear emissions amount to 1680 MtCe/yr, making the—7 percent Kyoto reduction target equal to 1533 MtCe/yr, as shown in the third column of Figure 6.1. The projected 2010 emissions for all six gases is 2204 MtCe/yr (first column), thus the total required reduction is expected to be 672 MtCe/yr. The energy-CO_2 policies described in the previous sections yield 436 MtCe/yr in reductions by 2010 (second column), leaving the United States with 236 MtCe/yr additional reductions to achieve from other policies and measures.

[17]These gases can be controlled interchangeably, using 100 year Global Warming Potentials (GWP), so long as the total carbon-equivalents (Ce) are reduced to 93 percent of their baseline levels. In contrast to the main three gases (CO_2, CH4, and N2O), which have a 1990 base year, the high GWP gases have a base year of 1995.

Figure 6.1: Projected emissions, 2010, all gases



The Kyoto agreement provides us with several options for obtaining the additional 236 MtCe/yr of reductions. Two of these options involve domestic reductions: the control of non-CO_2 gases ("multi-gas control") and the use of "sinks" or biotic sequestration, through the land use, land use change and forestry options allowed under the Protocol. The other options involve obtaining credits and allowances from international sources. Under the Kyoto Protocol, countries can purchase credits and allowances through the Clean Development Mechanism (CDM), Joint Implementation, or Emissions Trading (ET) to offset domestic emissions exceeding our 7 percent reduction target. This section examines how we might meet the Kyoto target through the use of these options, and what the costs and other implications might be.

6.1. Domestic options Article 3.3/3.4 and Sinks

GHG emissions and removals from land use and land use change and forestry (LULUCF) are a subject of great controversy and scientific uncertainty. The Kyoto Protocol treats LULUCF activities in two principal categories: afforestation, reforestation, and deforestation under Article 3.3, and "additional human-induced activities" such as forest and cropland management under Article 3.4. Different interpretations of these two articles can have widely varying impacts on the U.S. reduction commitment.[18] For instance, the U.S. estimate of business-as-usual forest uptake during the first commitment period is 288 MtCe/yr. If fully credited as an Article 3.4 activity, this uptake could provide credit equal to more than 40 percent of the U.S. reduction requirement, with no actual mitigation effort. However, the vast majority of countries do not interpret the Protocol as allowing credit for business-as-usual offsets, and therefore believe they should be excluded.

The starting point of our LULUCF analysis is the assumed adoption of the "consolidated negotiating text" of Jan Pronk, President [of COP6], as issued on June 18, 2001.[19] The so-called "Pronk text" reflects an attempted compromise among various

[18]For instance, different accounting methods and rules have been considered regarding: a) what constitutes a forest; b) which biotic pools and lands are counted; c) which activities are considered eligible for crediting under Article 3.4; and d) uncertainties in measuring above and below ground carbon stocks.

[19]See "Consolidated negotiating text proposed by the President", as revised June 18, 2001, FCCC/CP/2001/2/Rev.1, http://www.unfccc.int/resource/docs/cop6secpart/02r01.pdf

parties on a number of contentious issues. The most relevant here is the proposal for Articles 3.3 and 3.4.[20] In short, the Pronk text would cap total U.S. crediting from Article 3.4 activities and afforestation and reforestation projects in the CDM and JI at roughly 58 MtCe/yr.[21] Domestic forest management activities would be subject to an 85 percent discount. Thus, if one assumes the U.S. estimate above, the Pronk rules would result in 42 MtCe/yr of essentially zero-cost credit for forest management activities that are expected to occur anyway.[22] In addition, agricultural management (e.g. no-till agriculture, grazing land management, revegetation) would be allowed under a net-net accounting approach that would allow the United States to count another expected 10 MtCe/yr of business-as-usual, i.e. zero-cost, credit toward the cap. In sum, the Pronk proposal translates to 52 MtCe/yr of "free" carbon removals, and another 6 MtCe/yr that could be accrued through new domestic forest or agricultural management activities.[23] Based on a recent summary of LULUCF cost estimates, we assume that this relatively small amount of offsets could be purchased for $10/tCe.[24] A total of 58 MtCe/yr of LULUCF credit would therefore be available to help meet the reduction requirement of 236 MtCe/yr remaining after having adopted the energy-related CO_2 policies described above.

Multi-gas control

Multi-gas control is a fundamental aspect of the Protocol, and its potential for lowering the overall cost of achieving Kyoto targets has been the subject of several prominent studies (Reilly et al, 1999 and 2000). Table 6.1 shows baseline and projected emission levels for the non-CO_2 gases.[25]

Table 6.1. Baseline and Projected Emissions for non-CO_2 Kyoto Gases (MtCe/yr)

Gas	Base Year (1990/95)	7 percent Below Base Year	Projected 2010	Reductions Required [1]	Sources
Methane	170	158	186	28	(EPA 1999)
Nitrous Oxide	111	103	121	18	(Reilly et al 1999b; EPA 2001a)
High GWP Gases (HFC, PFC, SF6)	29	27	90	63	(EPA 2000)
Total	310	288	397	109	

[1] These are the reductions that would be needed if each gas were independently required to be 7 percent below its base year level.

Methane emissions are expected to grow by only 10 percent from 1990 to 2010, largely because of increased natural gas leakage and venting (due to increased consumption), enteric fermentation and anaerobic decomposition of manure (due to increased livestock and dairy production). Methane from landfills, which accounted for 37 percent of total methane emissions in 1990, are expected to decline slightly as a consequence of the Landfill Rule of the Clean Air Act (EPA, 1999), which requires all large landfills to collect and burn landfill gases.

Several measures could reduce methane emissions well below projected levels. USEPA estimates that capturing the methane from landfills not covered by the Landfill Rule, and using it to generate electricity, is economically attractive at

[20] Our assumption of Pronk conditions is a matter of "what if" analysis, rather than a tacit approval. The Pronk text may be insufficient in a number of ways, but the analysis and critique of the Pronk text is not the focus of this report.

[21] The Pronk text would prohibit first commitment period crediting of CDM projects that avoid deforestation.

[22] This figure is drawn from the Annex Table 1 of the April 9 draft of the Pronk text, which adopts Pronk adopts the accounting approach for Article 3.3. activities suggested by the IPCC Special Report of LULUCF. This approach yields an Article 3.3 debit of 7 MtCe/yr from net afforestation, reforestation, and deforestation activity, which under the Pronk approach could be offset fully by undiscounted forest management activities. Thus the 42 MtCe/yr estimate is based on 85 percent x (288—7) MtCe/yr.

[23] The Pronk proposal also allows this cap to be filled through afforestation and deforestation activities in the CDM.

[24] Missfeldt and Haites (2001) use a central estimate of 50 MtCe/year at $7.50/tCe for CDM afforestation and reforestation projects. They also assume the availability of 150 MtCe/year at $15/tCe for Article 3.4 sinks in Annex B countries. Note however that the Pronk 85 percent discount on forest management projects would, in principle, increase their cost accordingly (by 1/.15 or 6.7 times). However, given the relatively small quantity (6 MtCe) that could be purchased, lower cost opportunities in cropland management or the CDM should more than suffice.

[25] USEPA (1999, 2000) expects voluntary Climate Change Action Plan (CCAP) activities to reduce 2010 methane and high GWP gas emissions by about 10 percent and 15 percent, respectively, reductions that are not included in their 2010 projections shown in Table 1. Instead these reductions are embodied in both their and our cost curves.

enough sites to reduce projected landfill emissions by 21 percent (USEPA, 1999). At a cost of $30/tCe, the number of economically attractive sites increases sufficiently that 41 percent of landfill emissions can be reduced. Similarly, USEPA has constructed methane reduction cost curves for reducing leaks and venting in natural gas systems, recovering methane from underground mines, using anaerobic digesters to capture methane from manure. and reducing enteric fermentation by changing how livestock are fed and managed.

We have used a similar USEPA study to estimate the emissions reductions available for the high GWP gases (USEPA, 2000). Table 1 shows that the high-GWP gases, while only a small fraction of baseline emissions (first column), are expected to rise so rapidly that they will account for majority of net growth in non-CO_2 emissions relative to the 7 percent reduction target (last column). In many applications, other gases can be substituted for HFCs and PFCs, new industrial process can implemented, leaks can be reduced, and more efficient gas-using equipment can be installed. For instance, minor repairs of air conditioning and refrigeration equipment could save an estimated 6.5 MtCe/yr in HFC emissions by 2010 at cost of about $2/tCe. New cleaning processes for semiconductor manufacture could reduce PFC emissions by 8.6 MtCe/yr by 2010 at an estimated cost of about $17/tCe. In all, USEPA identified 37 measures for reducing high GWP gases, a list which is likely to be far from exhaustive given the limited experience with and data on abatement methods for these gases.

The major source of nitrous oxide in the United States is the application of nitrogen fertilizers, which results in about 70 percent of current emissions. Given the tendency of farmers to apply excess fertilizer to ensure good yields, effective strategies for N2O abatement from cropping practices has thus far been elusive. Thus, aside from measures to reduce N2O from adipic and nitric acid production (amounting to less than one MtCe/yr), and from mobile sources as a result of transportation policies (see below), we have not included a full analysis of N2O reduction opportunities (USEPA, 2001).

Relying largely on recent USEPA abatement studies (1999, 2000, 2001b), we developed the cost curve for reducing non-CO_2 gases depicted in Figure 2 below.[26] In addition to what is covered in the USEPA studies, we assumed that:

- Only 75 percent of the 2010 technical potential found in the USEPA studies would actually be achieved, and that policies and programs needed to promote these measures would add a transaction cost of $5/tCe.
- The savings in 2010 fossil fuel use resulting from the policies and measures implemented in the energy sector will yield corresponding benefits for several categories of non-CO_2 emissions. In particular, we assumed that a) reduced oil use in the transport sector (down 14 percent) will lead to a proportional decrease in N2O emissions from mobile sources[27]; b) reduced natural gas demand (down 13 percent) will result in proportionately fewer methane emissions from leaks and venting; and c) reduced coal production (down 49 percent) will lead to decreased underground mining and its associated emissions.[28]

Figure 6.2 shows that domestic options, taken together, are insufficient to reaching the Kyoto target. The line on the left is the "supply curve" of non-CO_2 abatement options, and the line on the right is the reduction requirement after both energy-related and Article 3.3/3.4 sinks are accounted for. Under current conditions (only 9 years left until 2010), the supply of remaining domestic options appears insufficient to satisfy demand. This gap ranges from 107 MtCe/yr at $10/tCe to 60 MtCe/yr at $100/tCe as shown. Therefore, to meet our Kyoto obligations, we are now in a situation of looking to the international market to fill this gap.

6.2 International options

The Kyoto Protocol creates are two principal types of greenhouse gas offsets in the international market: the purchase of surplus allowances from countries that are below their Kyoto targets and the creation of carbon credits through project-based mechanisms, CDM and JI.

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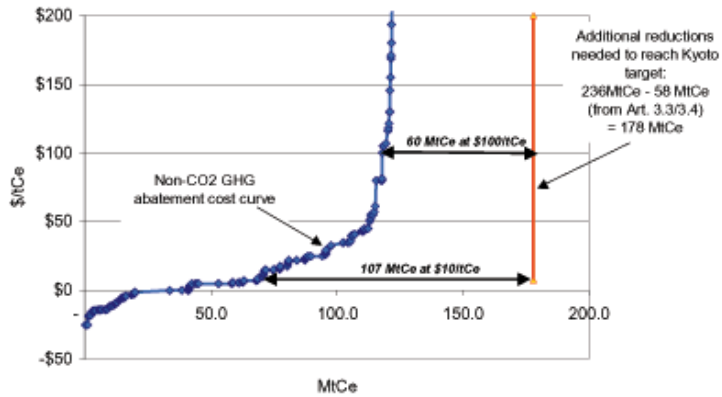
[26]The result is a cost curve that is similar and more up-to-date than that used in widely cited multiple gas studies (Reilly et al, 1999a; Reilly et al, 1999b; EERE, 2000).

[27]A similar assumption is used by European Commission (1998). Approximately 15 percent of N2O emissions are a byproduct of fuel combustion, largely by vehicles equipped with catalytic converters (USEPA, 2001a).

[28]We assume that coal production is a proportional to coal use (i.e. we ignore net imports/exports). USEPA expects that the marginal methane emissions rate will increase with production as an increasing fraction is expected to come from deeper underground mines (USEPA, 1999).

Figure 6.2: Non-CO2 GHG emissions reductions, cost and potential, 2010



Emissions allowance trading/hot air

The combination of emission targets based on circa 1990 emissions and the subsequent restructuring and decline of many economies in transition (EITs) means that these countries could have a large pool of excess emissions allowances, typically referred to as "hot air". Estimates of available hot air during the first commitment period range from under 100 MtCe/yr to nearly 500 MtCe/yr, largely from Russia and Ukraine.[29] This source of offsets could fulfill a significant fraction of the U.S. demand for additional reductions at very low cost (depending upon the level of competing demands of other Annex 1 parties for these allowances).[30] We assume however, that relevant actors in government and/or private sector charged with meeting emissions obligations will effectively limit the use of hot air. Relying heavily or entirely on hot air would be poor climate policy; as hot air supplants legitimate mitigation activity. It is also bad public relations; hot air has a stigma arising from years of negotiations controversy. Therefore, we assume that hot air will constitute no more than 50 percent of all international trading, and we assume a maximum availability of 200 MtCe/yr, based on a recent analysis (Victor et al, 2001).

CDM and JI

CDM and JI projects, can be an important part of a comprehensive climate policy, providing they truly contribute to sustainable development in the host countries and create genuine, additional GHG benefits. It is reasonable to expect that the U.S. Government and other stakeholders will want to develop the CDM and JI market in order to involve developing countries, engage in technology transfer, develop competitive advantages, and prepare for future commitment periods.

With the rules yet to be established on critical issues like additionality and baselines for CDM[31],and with a limited understanding of CDM/JI markets and transaction costs at high volumes of activity, cost and volume estimates for CDM and JI remain highly speculative. As with all GHG mitigation analysis exercises, both bottom-up and top-down methods can be used to develop such estimates. We have examined the data and literature for both approaches in coming up with a rough, aggregate cost curve for CDM and JI.

A bottom-up CDM/JI cost assessments can examine emerging project-based GHG trading markets—private broker transactions, the Prototype Carbon Fund (PCF), the Dutch ERUPT program, GEF activity, and so on—to get a sense of current "real-

[29]A range of 100–350 MtCe/yr is cited in Vrolijk and Grubb, 2000. Missfeldt and Haites, 2001 use a base estimate of approximately 240 MtCe/yr, with high estimate of 480 MtCe/yr. For this analysis, we assume the availability of 200 MtCe/yr, based on a recent analysis by Victor et al (2001).

[30]Since these credits are a form of windfall credits, it has been suggested that these economies could help protect the environmental integrity of the agreement by dedicating the income from "hot air" sales to energy projects that will bring about additional emissions reductions.

[31]CDM projects are required to be "additional" emissions reductions but rules have not been agreed to which would determine what is additional. In addition, credits will be given based on reductions in comparison to a baseline. A methodology for establishing baselines is also the subject of ongoing negotiations.

world" prices and transaction costs. However, the size of this market remains very small in comparison with the total flows that are likely once CDM and JI are underway.[32] The type of activities being undertaken today, such as the first PCF project, a landfill gas capture effort in Latvia, could well represent "lowhanging fruit" that would be unable to supply the several hundreds MtCe/yr of CDM and JI activity that are expected under some Kyoto compliance scenarios (Missfeldt and Haites, 2001; Grubb and Vrolijk, 2000).

To get a better sense of the costs of projects available at higher volumes, these "early project" estimates can be combined with non-Annex B "country studies"—the many national GHG abatement studies performed with support from UNEP, UNDP, U.S. Country Studies, and other bilateral and national programs. A study by the Dutch Energy Foundation (ECN, et al., 1999) provides a good example of such an analysis. Extrapolating from GEF projects along with 25 country studies, this study found that 440 MtCe/yr of non-Annex 1 reductions could be available at less than $22/tCe.

However, the uncertainty related to these bottom-up studies is fundamentally quite high. National studies typically exclude a significant number of abatement options due to sheer lack of data, resources, or necessity. At the same time, abatement costing studies may understate transaction and barrier removal costs, especially those specific to CDM and JI projects. For instance, transaction costs for project preparation, baselines, certification, and monitoring and evaluation could also change from current levels, once the CDM and JI markets take off and clear rules are established. Finally, the ultimate approach adopted for deciding on project additionality and baselines could have a major impact on the size and shape of the market.

Similarly, the possibility of limited crediting lifetimes, or discounting of carbon reductions in future projects years, as proposed by some, could increase the effective cost per tCe. In a recent analysis, Bernow et al. (2000) illustrated how different approaches to standardizing baselines could lead to differences in additional power sector activity (tCe) of a factor of 4. These types of considerations are rarely included in CDM/JI analyses, either bottom-up or top-down.

Many climate policy assessments rely on CDM and JI cost curves developed by a handful of "top-down" modelers. Ellerman and Decaux (1998) applied the MIT-EPPA computable general equilibrium model to develop parameterized cost curves for five non-Annex 1 regions, which have since been widely used (Reilly et al, 1999; Haites, 2000; Krause et al, 2001; Missfeldt and Haites, 2001; Grutter, 2001). Applications of the ABARE-GTEM model have been used in a similar manner (Vrolijk and Grubb, 2000; Grutter, 2001; EMF, 1999). While compared with bottom-up studies, the EPPA and GTEM model runs provide more comprehensive assessments of reduction potential and cost from an economy-wide perspective, they do a poorer job of reflecting the dynamics of project-based investments.

It turns out that the GTEM, EPPA, and bottom-up ECN studies, do yield rather similar results. At $20/tCe, the total CDM potential under the GTEM run is 470 MtCe/yr, while under EPPA it is 480 MtCe/yr, and as noted above, and for ECN et al (1999), the figure is closer to 440 MtCe/yr.[33] Given the small differences, we adopt the GTEM results, since they provide a fuller CDM curve, include multiple gases, and provide a cost curve for JI investments as well.

6.3 Combining the options

There are two ways to combine the available options to meet our Kyoto target. We can prioritize which options to rely on more heavily, based on their strategic advantages and co-benefits, as we have done for energy/CO_2 policies. Or we can simply seek lowest-cost solution for the near term. A long-term climate policy perspective argues for the former approach. For example, rules and criteria for JI, and especially CDM, should be designed so that additionality, sustainability, and technology transfer are maximized. Ideally, our cost curves for CDM and JI would reflect only

[32]For instance, anecdotal evidence suggests that the current international GHG emission credit market is at about $25 million in transactions per year. In addition the PCF and ERUPT have committed another $225 million over the next few years. This figure compares with the $10–20 billion/year market (about 400–500 MtCe/year at $20–40/tCe) that some analysts project under CDM alone (Missfeldt and Haites, 2001).

[33]The EPPA and GTEM figures are drawn from the CERT model described in Grutter, 2001. The EPPA scenario used here includes only CO_2, while the GTEM scenario includes all gases. All of these studies exclude sinks, which is largely consistent with the implications of the Pronk proposal.

investments that are consistent with those criteria. However, our current ability to reflect such criteria in quantitative estimates of CDM and JI potential is limited.[34]

It is possible to model priority investment in the domestic reductions of non-CO_2 gases by implementing some measures that are higher cost than the global market clearing carbon price. Just as energy/CO_2 measures like a Renewable Portfolio Standard can be justified by the technological progress, long-term cost reductions, other co-benefits that they induce, so too can some non-CO_2 measures. While we have not attempted to evaluate specific policies for nonCO_2 gases as we have for CO_2, we have picked a point on the non-CO_2 cost curve, $100/tCe, to reflect an emphasis on domestic action. At $100/tCe, domestic non-$CO_2$ measures can deliver 118 MtCe/yr of reductions, still about 60 MtCe/yr short of the Kyoto goal, to which we must turn to the international market.

To model the global emissions trading market, we used the CDM/JI cost curves, and hot air assumptions described above, together with assumptions regarding the demand for credits and allowances from all Annex B parties.[35] This model yields market-clearing prices and quantities for each of the three principal flexible mechanisms: CDM, JI, and ET/hot air.[36] The results are shown in Table 6.2.

The first row of the table shows that 93 MtCe/yr are available at net savings or no net cost, over half from the non-additional or "anyways" forest management and other Article 3.4 sinks activities implicit in the Pronk text. Another 77 MtCe/yr of non-CO_2 gas savings are available as we climb the cost curve from $0–100/tC (second row). The net result is that nearly $1.8 billion per year is invested in technologies and practices to reduce non-CO_2 GHG emissions by 118 MtCe/yr in 2010. Another $60 million per year is directed toward the 6 MtCe/yr of expected additional sinks projects allowed under the Pronk proposal. The third row shows that of the 60 MtCe/yr of international trading, half comes from CDM projects, and much of the rest from hot air. The model we use estimates a market-clearing price of about $8/tCe for this 60 MtC/yr of purchased credits and allowance, amounting to a total annual cost of less than $500 million.[37]

Table 6.2: Reductions available in 2010 up from various sources (in MtCe)

	Domestic Options		International Trade			Total
	Non-CO_2 gases	Sinks	CDM	JI	Hot air (ET)	
Amount available at < or = $0/tCe (MtCe)	41	52	.....	.....	.....	93
Amount available at $0-$100 (MtCe)	77	6	.....	.....	.....	83
Amount available at $8 (MtCe)	.....	.....	30	6	25	60
Annual costs ($Million)	$1,783	$60	$235	$48	$196	$2,322

In summary, of the 672 MtCe/yr in total reductions needed to reach Kyoto by 2010, nearly 65 percent comes from energy sector CO_2 reduction policies, 18 percent from domestic non-CO_2 gas abatement, 9 percent from domestic sinks, and 9 percent from the international market. The net economic benefits deriving from the energy-related carbon reductions reach nearly $50 billion/yr in 2010. The total annual cost for the 35 percent of 2010 reductions coming those last three options—non-CO_2 control, sinks, and international trading—is estimated at approximately $2.3 billion, making the total package a positive economic portfolio by a large margin. Had we taken the other approach noted at the beginning of the section—aiming for the lowest near-term compliance cost—we would rely more heavily on international trading.

[34]We did briefly examine the potential contribution of a CDM fast track for renewables and efficiency, as embodied in the Pronk text. Applying the power sector CDM model developed by Bernow et al (2001), we found that a carbon price of $20/tCe would induce only 3 MtCe/yr of new renewable energy project activity by 2010. At a price of $100/tCe, this amount rises to 18 MtCe/yr. Given that a large technical potential for energy efficiency projects exists at low or negative cost per tCe, fast track efficiency projects (under 5 MW useful energy equivalents according to Pronk text) could significantly increase the amount available at lower costs.

[35]For the estimated demand for CDM, JI, and ET/hot air from other Annex 1 parties, we used a combination of EPPA and GTEM cost curves.35 (Reilly et al, 1999b, and Ellerman and Decaux, 1998; Vrolijk and Grubb, 2000; Grutter, 2001).

[36]Our approach is similar to that used in a few other recent studies (Grutter, 2001; Haites, 2000; Missfeldt and Haites, 2001; Krause et al, 2001; Vrolijk and Grubb, 2000).

[37]The market clearing price is lower here than in other similar studies, due in large part to a much lower U.S. demand for international trade, which results from of our aggressive pursuit of domestic abatement options and the fact that we assume that domestic policies and investments should be done as a matter of sound energy and environmental policy (i.e. they are price-inelastic).

We modeled this scenario, and found that it would nearly double the amount of international trading, and lower the overall annual cost to $0.9 billion, and reduce the amount of non-CO_2 control by over 40 percent. This additional benefit is minor in comparison to the economic and environmental benefits of the entire policy portfolio.

7. Conclusions

This study shows that the United States can achieve its carbon reduction target under the Kyoto Protocol—7 percent below 1990 levels for the first budget period of the Protocol. Relying on national policies and measures for greenhouse gas reductions, and accessing the flexibility mechanisms of the Kyoto Protocol for a small portion of its total reductions, the United States would enjoy net economic savings as a result of this Climate Protection package. In order to achieve these reductions, policies should be implemented as soon as possible to accelerate the shift away from carbon-intensive fossil fuels and toward energy efficient equipment and renewable sources of energy. Such action would lead to carbon emission reductions of about 24 percent by 2010 relative to the Base Case, bringing emissions to about 2.5 percent above 1990 levels. Furthermore, emissions of other pollutants would also be reduced, thus improving local air quality and public health.

Adopting these policies at the national level through legislation will not only help America meet its Kyoto targets but will also lead to economic savings for consumers, as households and businesses would enjoy annual energy bill reductions in excess of their investments. These net annual savings would increase over time, reaching nearly $113 per household in 2010 and $375 in 2020. The cumulative net savings would be about $114 billion (present value 1999$) through 2010 and $576 through 2020.

Greenhouse emissions in the United States are now about 15 percent higher than they were in 1990. Together with the looming proximity of the first budget period, and a realistic start date no earlier than 2003 for the implementation of the national policies, reductions in energy-related carbon would have to be augmented by other greenhouse gas reduction options in order to reach the Kyoto target. In total, the Climate Protection case in 2010 includes 436 Mtc/yr energy-related carbon reductions, 58 MtC/yr domestic land-based carbon reductions, 118 MtC/yr reductions in domestic non-carbon greenhouse gases, and 60 MtC/yr in allowances purchased through the "flexibility mechanisms" of the Kyoto Protocol.

While implementing this set of policies and additional non-energy related measures is an ambitious undertaking, it represents an important transitional strategy to meet the long-term requirements of climate protection. It builds the technological and institutional foundation for much deeper long-term emission reductions needed for climate protection. Such actions would stimulate innovation and invention here in the United States while positioning the United States as a responsible international leader in meeting the global challenge of climate change.

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APPENDIX 1: ENERGY AND CARBON SUMMARIES

Total Energy Consumption by Fuel and by Sector in 1990 (Quads)

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.06	0.10	2.75	0.00	16.20	19.11
Oil	1.27	0.91	8.31	21.81	1.23	33.53
Gas	4.52	2.76	8.47	0.68	2.88	19.31
Nuclear	0.00	0.00	0.00	0.00	6.19	6.19
Hydro	0.00	0.00	0.00	0.00	2.99	2.99
Non-Hydro	0.83	0.09	2.07	0.00	0.50	3.49
Primary Total	**6.68**	**3.86**	**21.60**	**22.49**	**29.99**	**84.62**
Electricity	3.15	2.86	3.24	0.01		9.26
End-Use Total	**9.83**	**6.72**	**24.84**	**22.50**		**63.89**

Total Energy Consumption by Fuel and by Sector in 2005 (Quads), Base Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.07	2.62	0.00	21.43	24.18
Oil	1.42	0.66	9.95	29.06	0.32	41.41
Gas	5.46	3.71	10.43	0.83	5.41	25.84
Nuclear	0.00	0.00	0.00	0.00	7.90	7.90
Hydro	0.00	0.00	0.00	0.00	3.08	3.08
Non-Hydro	0.43	0.08	2.42	0.03	1.10	4.06
Primary Total	**7.36**	**4.52**	**25.42**	**29.91**	**39.25**	**106.46**
Electricity	4.49	4.34	3.90	0.09		12.82
End-UseTotal	**11.85**	**8.86**	**29.32**	**30.00**		**80.04**

Total Energy Consumption by Fuel and by Sector in 2005 (Quads). Policy Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.07	2.25	0.00	17.26	19.63
Oil	1.41	0.64	9.40	27.80	0.23	39.49
Gas	5.35	3.74	10.27	0.83	4.48	24.67
Nuclear	0.00	0.00	0.00	0.00	7.90	7.90
Hydro	0.00	0.00	0.00	0.00	3.12	3.12
Non-Hydro	0.43	0.08	2.42	0.21	4.03	7.17
Primary Total	**7.23**	**4.53**	**24.35**	**28.84**	**37.03**	**101.98**
Electricity	4.27	4.01	3.38	0.09		11.75
End-UseTotal	**11.50**	**8.54**	**27.73**	**28.93**		**76.70**

Total Energy Consumption by Fuel and by Sector in 2010 (Quads), Base Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.07	2.62	0.00	22.41	25.16
Oil	1.29	0.67	10.55	31.74	0.19	44.43
Gas	5.70	3.89	11.14	0.99	6.97	28.69
Nuclear	0.00	0.00	0.00	0.00	7.69	7.69
Hydro	0.00	0.00	0.00	0.00	3.08	3.08
Non-Hydro	0.43	0.08	2.64	0.04	1.60	4.79
Primary Total	**7.47**	**4.71**	**26.95**	**32.77**	**41.94**	**113.84**
Electricity	4.95	4.86	4.17	0.12		14.10
End-UseTotal	**12.42**	**9.57**	**31.12**	**32.89**		**86.00**

Total Energy Consumption by Fuel and by Sector in 2010 (Quads), Policy Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.07	2.09	0.00	10.74	12.95
Oil	1.26	0.62	9.15	27.38	0.28	38.70
Gas	5.39	3.93	10.73	0.99	6.33	27.37
Nuclear	0.00	0.00	0.00	0.00	7.91	7.91
Hydro	0.00	0.00	0.00	0.00	3.12	3.12
Non-Hydro	0.43	0.08	2.64	0.54	7.02	10.71
Primary Total	**7.13**	**4.71**	**24.62**	**28.91**	**35.40**	**100.76**
Electricity	4.12	3.79	2.91	0.12		10.93
End-UseTotal	**11.25**	**8.49**	**27.52**	**29.03**		**76.29**

Percentage Difference in Primary Consumption by 2010 Relative to 1990

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	-13%	-28%	-24%	NA	-34%	-32%
Oil	-1%	-32%	10%	26%	-77%	15%
Gas	19%	42%	27%	45%	120%	42%
Nuclear	NA	NA	NA	NA	28%	28%
Hydro	NA	NA	NA	NA	4%	4%
Non-Hydro	-48%	-8%	28%	NA	1304%	207%
Primary Total	**7%**	**22%**	**14%**	**29%**	**18%**	**19%**
Electricity	31%	32%	-10%	1081%		18%
Total	**14%**	**26%**	**11%**	**29%**		**19%**

Total Energy Consumption by Fuel and by Sector in 2015 (Quads), Base Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.07	2.62	0.00	22.97	25.72
Oil	1.24	0.67	11.15	34.29	0.18	47.52
Gas	5.99	4.05	11.78	1.12	9.37	32.32
Nuclear	0.00	0.00	0.00	0.00	6.79	6.79
Hydro	0.00	0.00	0.00	0.00	3.07	3.07
Non-Hydro	0.43	0.08	2.86	0.04	1.59	5.01
Primary Total	**7.71**	**4.88**	**28.41**	**35.45**	**43.97**	**120.42**
Electricity	5.36	5.30	4.44	0.15		15.25
End-UseTotal	**13.08**	**10.18**	**32.85**	**35.60**		**91.70**

Total Energy Consumption by Fuel and by Sector in 2015 (Quads), Policy Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.07	1.99	0.00	5.70	7.81
Oil	1.18	0.58	8.70	25.65	0.13	36.25
Gas	5.31	4.05	11.48	1.12	5.85	27.81
Nuclear	0.00	0.00	0.00	0.00	7.60	7.60
Hydro	0.00	0.00	0.00	0.00	3.11	3.11
Non-Hydro	0.43	0.08	2.86	0.79	7.50	11.67
Primary Total	**6.98**	**4.79**	**25.03**	**27.56**	**29.89**	**94.26**
Electricity	3.77	3.20	2.18	0.15		9.29
End-UseTotal	**10.75**	**7.99**	**27.21**	**27.71**		**73.66**

Percentage Difference in Primary Consumption by 2015 Relative to 1990

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	-16%	-26%	-28%	NA	-65%	-59%
Oil	-7%	-37%	5%	18%	-89%	8%
Gas	18%	47%	35%	65%	103%	44%
Nuclear	NA	NA	NA	NA	23%	23%
Hydro	NA	NA	NA	NA	4%	4%
Non-Hydro	-48%	-8%	38%	NA	1400%	234%
Primary Total	**5%**	**24%**	**16%**	**23%**	**0%**	**11%**
Electricity	20%	12%	-33%	1355%	NA	0%
Total	**9%**	**19%**	**10%**	**23%**	**NA**	**15%**

Total Energy Consumption by Fuel and by Sector in 2020 (Quads), Base Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.08	2.62	0.00	23.50	26.24
Oil	1.21	0.66	11.78	36.77	0.20	50.62
Gas	6.31	4.14	12.38	1.24	11.40	35.48
Nuclear	0.00	0.00	0.00	0.00	6.09	6.09
Hydro	0.00	0.00	0.00	0.00	3.06	3.06
Non-Hydro	0.44	0.08	3.08	0.05	1.62	5.27
Primary Total	**8.01**	**4.96**	**29.86**	**38.06**	**45.87**	**126.76**
Electricity	5.80	5.59	4.79	0.17		16.34
End-UseTotal	**13.81**	**10.54**	**34.65**	**38.23**		**97.23**

Total Energy Consumption by Fuel and by Sector in 2020 (Quads), Policy Case

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	0.05	0.08	1.90	0.00	2.45	4.48
Oil	1.13	0.52	8.34	25.15	0.07	35.21
Gas	5.26	4.09	12.38	1.24	4.63	27.61
Nuclear	0.00	0.00	0.00	0.00	6.90	6.90
Hydro	0.00	0.00	0.00	0.00	3.11	3.11
Non-Hydro	0.44	0.08	3.08	1.05	7.18	11.84
Primary Total	**6.88**	**4.77**	**25.71**	**27.45**	**24.35**	**89.15**
Electricity	3.46	2.49	1.45	0.17		7.56
End-UseTotal	**10.34**	**7.26**	**27.15**	**27.61**		**72.37**

Percentage Difference in Primary Consumption by 2020 Relative to 1990

	Residential	Commercial	Industrial	Transportation	Electricity	Total
Coal	-19%	-24%	-31%	NA	-85%	-77%
Oil	-11%	-43%	0%	15%	-94%	5%
Gas	16%	48%	46%	83%	61%	43%
Nuclear	NA	NA	NA	NA	12%	12%
Hydro	NA	NA	NA	NA	4%	4%
Non-Hydro	-47%	-8%	49%	NA	1337%	239%
Primary Total	**3%**	**24%**	**19%**	**22%**	**-19%**	**5%**
Electricity	10%	-13%	-55%	1559%	NA	-18%
Total	**5%**	**8%**	**9%**	**23%**	**NA**	**13%**

Carbon Emissions in 1990 (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	41.2	26.8	408.8	NA	476.8
Residential	65.0	24.0	1.6	162.4	253.0
Commercial	38.7	18.1	2.3	147.5	206.6
Industrial	119.6	91.9	67.8	166.3	445.6
Transportation	9.9	422.3	0.0	0.7	432.9
Totals	274.4	583.1	480.5	0.0	1,338.0
Fossil Fuel Share	20.5%	43.6%	35.9%		
Elect. Share					35.6%

Carbon Emissions in 2005 -- Base Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	77.9	7.0	544.0	NA	628.9
Residential	78.6	26.9	1.3	220.4	327.1
Commercial	53.5	12.9	1.8	212.9	281.0
Industrial	150.2	99.6	66.6	191.3	507.7
Transportation	11.9	557.2	0.0	4.3	573.5
Totals	372.1	703.6	613.6	0.0	1,689.3
Fossil Fuel Share	22.0%	41.7%	36.3%		
Elect. Share					37.2%

Carbon Emissions in 2005 -- Policy Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	64.7	5.1	438.5	NA	508.3
Residential	77.0	26.6	1.3	178.4	283.2
Commercial	53.8	12.5	1.8	173.2	241.3
Industrial	147.9	89.6	57.2	150.4	445.1
Transportation	11.9	533.1	0.0	4.3	549.4
Totals	355.3	666.9	498.8	0.0	1,521.1
Fossil Fuel Share	23.4%	43.8%	32.8%		
Elect. Share					33.4%

Carbon Emissions in 2010 -- Base Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	100.4	4.2	568.8	NA	673.4
Residential	82.0	24.4	1.3	236.5	344.3
Commercial	56.0	13.1	1.9	232.2	303.2
Industrial	160.4	105.9	66.4	199.0	531.8
Transportation	14.2	608.9	0.0	5.6	628.7
Totals	413.1	756.4	638.5	0.0	1,808.0
Fossil Fuel Share	22.9%	41.8%	35.3%		
Elect. Share					37.2%

Carbon Emissions in 2010 -- Policy Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	91.1	6.4	274.7	NA	372.1
Residential	77.6	23.8	1.3	128.5	231.2
Commercial	56.6	12.2	1.9	127.8	198.4
Industrial	154.6	80.0	53.0	106.4	394.0
Transportation	14.2	525.1	0.0	5.6	545.0
Totals	394.0	647.5	330.9	0.0	1,372.3
Fossil Fuel Share	28.7%	47.2%	24.1%		
Elect. Share					27.1%

Percentage Difference in Carbon Emissions in 2010 Relative to 1990

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	121%	-76%	-33%	NA	-22%
Residential	19%	-1%	-16%	-21%	-9%
Commercial	46%	-33%	-20%	-13%	-4%
Industrial	29%	-13%	-22%	-36%	-12%
Transportation	44%	24%	NA	706%	26%
Totals	44%	11%	-31%	NA	3%

Carbon Emissions in 2015 -- Base Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	77.9	7.0	544.0	NA	628.9
Residential	86.2	23.4	1.3	253.9	364.9
Commercial	58.4	13.1	1.9	250.9	324.3
Industrial	169.6	112.2	66.4	210.3	558.6
Transportation	16.2	657.6	0.0	6.9	680.6
Totals	408.3	813.3	613.6	0.0	1,835.3
Fossil Fuel Share	22.2%	44.3%	33.4%		
Elect. Share					34.3%

Carbon Emissions in 2015 -- Policy Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	64.7	5.1	438.5	NA	508.3
Residential	76.5	22.3	1.3	78.7	178.8
Commercial	58.3	11.3	1.9	79.1	150.6
Industrial	165.3	67.0	50.4	65.6	348.3
Transportation	16.2	491.4	0.0	6.9	514.5
Totals	380.9	597.1	492.2	0.0	1,470.2
Fossil Fuel Share	25.9%	40.6%	33.5%		
Elect. Share					34.6%

Percentage Difference in Carbon Emissions in 2015 Relative to 1990

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	57%	-81%	7%	NA	7%
Residential	18%	-7%	-19%	-52%	-29%
Commercial	51%	-38%	-17%	-46%	-27%
Industrial	38%	-27%	-26%	-61%	-22%
Transportation	63%	16%	NA	884%	19%
Totals	39%	2%	2%	NA	10%

Carbon Emissions in 2020 -- Base Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	77.9	7.0	544.0	NA	628.9
Residential	90.9	22.9	1.3	271.6	386.6
Commercial	59.6	12.9	2.0	261.6	336.0
Industrial	178.3	119.4	66.5	224.0	588.2
Transportation	17.9	705.1	0.0	7.8	730.8
Totals	424.6	867.2	613.7	0.0	1,905.6
Fossil Fuel Share	22.3%	45.5%	32.2%		
Elect. Share					33.0%

Carbon Emissions in 2020 -- Policy Case (Million metric tons)

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	64.7	5.1	438.5	NA	508.3
Residential	75.8	21.2	1.3	44.0	142.3
Commercial	58.9	10.2	2.0	42.5	113.6
Industrial	178.3	55.7	48.3	36.4	318.7
Transportation	17.9	481.4	0.0	7.8	507.1
Totals	395.6	573.7	490.0	0.0	1,459.2
Fossil Fuel Share	27.1%	39.3%	33.6%		
Elect. Share					34.8%

Percentage Difference in Carbon Emissions in 2020 Relative to 1990

Sector	Gas	Oil	Coal	Indirect Electric	Totals
Electric	56.9%	-80.9%	7.3%	NA	6.6%
Residential	16.6%	-11.6%	-21.7%	-72.9%	-43.8%
Commercial	52.2%	-43.6%	-15.0%	-71.2%	-45.0%
Industrial	49.1%	-39.4%	-28.8%	-78.1%	-28.5%
Transportation	81.1%	14.0%	NA	1009.4%	17.1%
Totals	44.2%	-1.6%	2.0%	NA	9.1%

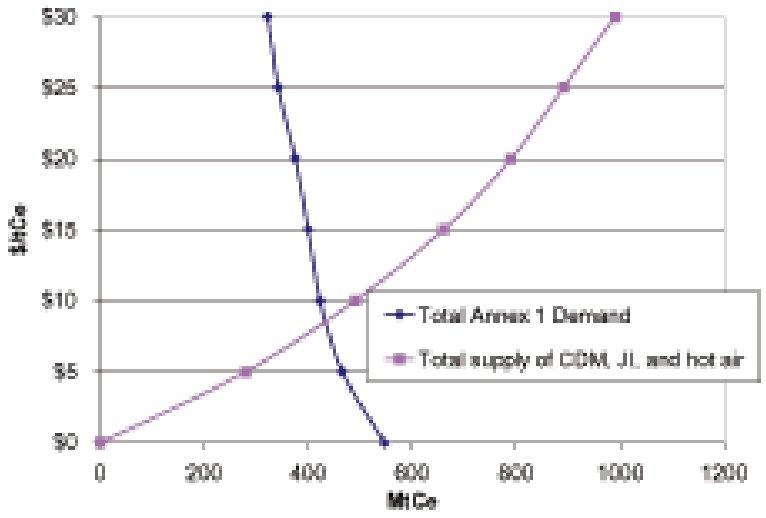
APPENDIX 2. MODELING GLOBAL CARBON MARKETS

We first construct an aggregate Annex 1 demand curve for international emissions reductions from CDM, JI, and ET/hot air. This demand curve represents how short, at a given price, Annex 1 countries are from meeting their Kyoto target using only domestic options (energy sector CO_2, non-CO_2 gas, and Article 3.3/3.4options). We can then compare this demand curve with the supply curve for CDM, JI, and ET/hot air (based on the assumptions described above) to find the market-clearing price. Our approach is similar to that used in a few other recent studies (Grutter, 2001; Haites, 2000; Missfeldt and Haites, 2001; Krause et al, 2001; Vrolijk and Grubb, 2000).

To create the Annex 1 demand curve, we combine a U.S. demand curve—the "additional required reductions" line in Figure 6.2 minus the cost curve or amount available from non-CO_2 measures at a given price—with estimated demand for CDM, JI, and ET/hot air from other Annex 1 parties, excluding EITs. We estimate

the non-US demand using a combination of EPPA and GTEM cost curves.[38] There is a resulting asymmetry in this approach, since the non-US cost curves we use do not embody the aggressive pursuit of domestic energy sector reductions found in our analysis for the United States. As a result the total demand for and use of international trading, as well as the resulting market clearing price, is significantly higher than it would be were we to have looked at a similarly aggressive approach in all Annex 1 countries. The result is shown in the figure at right.

Figure 3. Supply and demand for international emissions credits and allowances, 2010.



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Senator JEFFORDS. There is no question that we must be concerned with threats of today, like the thousands of people dying prematurely every year from power plant pollution. But we cannot let the press of quarterly reports or the hunt for short-term profits prevent us from acting to reduce the threats of tomorrow. That is especially true in the case of terrorism or global warming where we have been presented with credible information about the threats.

As some of my colleagues know, I have a special interest in the U.N. Convention to Combat Desertification and pressed hard for its ratification. Senator Helms was instrumental in moving that treaty and I want to thank him for his work and that of his staff in helping me and others get that agreement approved. That treaty addressed land degradation in some of the most impoverished areas of the world. It is designed to encourage participatory democracy and stakeholder involvement. I look forward to seeing the implementation of that treaty.

I have an interest in ratifying and implementing the Convention on Persistent Organic Pollutants. I have introduced legislation maintaining the spirit of that treaty, and I hope we will be able to get that moving as soon as the U.S. can participate in the "Conference of Parties" and the review committee.

There seems to be a general good news regarding chemicals that harm the ozone layer. From all indications, the Montreal Protocol

has been a success, though I gather there are some additional amendments coming soon. I will be interested to learn how our efforts have reduced that ozone hole.

There is less clear news on the status of the Convention of Biologic Diversity, which was signed in 1993 but which has been not sent to the Senate for confirmation and ratification.

I would also appreciate hearing an update from our witnesses on the progress made toward the implementation of the Basel Convention regarding the International Transportation of Hazardous Waste.

Finally, I would note something that is a little different between international agreements and our more conventional environmental laws. They often seem to be missing performance criteria or include very weak commitments. Unfortunately, in the case of climate change, even when commitments are minimal, such as reporting on the policies and measures we have adopted and achieved in 1990 levels, we have failed. So I would urge our negotiators to push for more specific environmental laws using targets and timetables. That will make it easier for the Senate to know whether the treaties we have ratified are succeeding. Also, I believe the result will be better for the environment and sustainable development.

I want to thank you for being with us here today. I now turn to my good co-chairman friend, Senator Sarbanes.

OPENING STATEMENT OF HON. PAUL S. SARBANES, U.S. SENATOR FROM THE STATE OF MARYLAND

Senator SARBANES. Thank you very much, Senator Jeffords. I am very pleased to join my colleague, Senator Jeffords, in this joint hearing between the Environment and Public Works Committee and the Senate Foreign Relations Committee on the very important issue of the review of the implementation of environmental treaties.

Senator Jeffords, as we all well know, has been a very strong advocate of the need to protect our environment across the range of issues. I certainly want at the very outset to thank him for his leadership. The country, not just the country, in a sense the world, and I am going to make reference to this later, these environmental issues know no national boundaries, and we are all extremely grateful to him.

I also want to thank him for suggesting this idea of a joint hearing undertaken by the two committees. Joint hearings can I think provide a useful opportunity to examine issues that cut across committee jurisdiction, and I think they also serve to encourage Members of Congress as well as the Administration and private sector to think about the wider implications of the issues with which we are wrestling. That is obviously one of our purposes here today.

Treaties are often negotiated over many months, indeed, even longer, and in many cases in a very painstaking way. So when they come into force many people heave a sigh of relief that the process has been completed. Of course, we review the treaties in the Foreign Relations Committee and we try to carefully examine them, and then once we ratify them we think well that is over and done with. But the fact of the matter is that once the treaty is ratified, the process has only begun. And what really matters, in addition

to adopting the treaty to begin with, is how governments, including our own, actually implement the treaties.

This hearing will examine a number of environmental treaties that the United States has ratified. Just to mention a few, the United Nations Framework Convention on Climate Change, the Montreal Protocol on Substances that Deplete the Ozone Layer, the Convention on International Trade in Endangered Species of Wild Flora and Fauna, the North American Agreement on Environmental Cooperation, and the U.N. Convention to Combat Desertification, which Senator Jeffords made reference to. I do not think that treaty would ever have been approved but for his efforts.

We will ask witnesses from the Administration and private sector specialists for their appraisal of our Government's implementation of these various treaties. For example:

Are we living up to our commitments under these treaties?

Are we providing sufficient resources, both financial and technical, to help developing countries meet their commitments under these treaties?

What are the success stories?

Where are we falling short, and what can be done to ensure that we do a better job?

What are the international ramifications of a failure on our part to meet our commitments under these treaties?

I look forward to hearing our witnesses address some of these important questions.

The protection of the environment is something that I think we have come to understand is a matter of the first priority, hopefully here in the Congress, certainly across the country. In fact, I am inclined to think that the country is often ahead of the Congress and ahead of the Administration on this very important issue. Not only do we have an obligation to ensure that our Government is honoring its environmental commitments, but we should encourage our Government to play a leading role in assisting others around the world to help them meet their commitments. We constantly brag that we are first, and we ought to be first in this regard, as well as in other respects.

Environmental problems, as we all know, have no boundaries. An environmental problem halfway around the globe can have adverse consequences for our own families here in the United States. Similarly, an environmental problem here in this country can affect the lives of millions of people overseas. The Chernobyl nuclear accident, to take but one example, had consequences far, far beyond the boundaries of where the event occurred.

So I think this is an important joint effort here by the two committees and I want to again thank Senator Jeffords for suggesting this. I look forward to hearing from the witnesses.

Mr. Chairman, I ought to say at the outset, because of my involvement in the other bill to which you made reference, I do not know that I am going to be able to stay through the morning but I certainly wanted to be here at the outset. I may have to leave, maybe I can get back. But this is certainly a very important initiative and I thank you for it.

Senator JEFFORDS. Thank you for being here. Your presence makes this a much more rewarding situation for the hearing, but

I do understand that you have got a few little problems you are dealing with.

Senator CHAFEE.

OPENING STATEMENT OF HON. LINCOLN CHAFEE, U.S. SENATOR FROM THE STATE OF RHODE ISLAND

Senator CHAFEE. Thank you very much, Senator Jeffords, for holding the hearing. As Senator Sarbanes said, certainly the world is looking at us as to how we are going to act on these treaties and are we going to be a responsible member of the global community on these environmental issues which have such immense ramifications for future generations.

We hold a certain place in the world after the fall of the Berlin Wall and are kind of at the top of the heap. With that comes enormous responsibility. We have to exercise it on these treaties that have been negotiated over many, many months. It is my thought that we have the responsibility to protect our world for future generations. And whether it is global warming or desertification or the health of our fisheries, the onus is on us. Everybody is looking at us to see, are we going to be a leader? Are we going to be a country that all around the world people look at and say they are doing the right thing, they are protecting these valuable resources? That not only are they consuming resources at an enormous rate in the United States of America, but they are looking ahead and trying to do the right thing for many, many generations.

So thank you again, Mr. Chairman, for holding this hearing today.

Senator JEFFORDS. Thank you, Senator Chafee. It is a pleasure to have you with us.

Now on our first panel the first witness is John F. Turner, the Assistant Secretary for the Bureau of Oceans and International Environmental and Scientific Affairs, U.S. Department of State, Washington, DC, and the other member of our panel is Mr. James Connaughton, Chair of the White House Council on Environmental Quality, Washington, DC.

Welcome. It is a pleasure to have you with us.

Mr. Turner, please proceed.

STATEMENT OF HON. JOHN F. TURNER, ASSISTANT SECRETARY FOR THE BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Mr. TURNER. Chairman Jeffords, Chairman Sarbanes, Senator Chafee, I appreciate this opportunity to appear before you today with my colleague, Jim Connaughton, to review the U.S. implementation of some important environmental treaties initiatives.

I believe the United States has a strong record on global environmental issues. And as one who has been involved in conservation most of my career, I want to pause and thank each one of you for the dedication and commitment, leadership you have given to domestic and international environmental affairs. But I am proud of the leadership our country has shown to spearhead the negotiation agreements and their subsequent implementation on issues ranging from ozone depletion to stemming illegal trade in endangered

species. As an example of this continuing leadership, the President just recently submitted to the Senate an important treaty between the United States and Russia that would strengthen the conservation of our shared polar bear resources.

The State Department plays an important role in negotiating, coordinating, and monitoring the implementation of environmental agreements and then working through the interagency and international processes to ensure U.S. interests are served. Often, however, as you realize, other agencies within our Government are actually responsible for implementation of some of these treaties.

In addition to my written statement submitted for the record, I would just like to briefly describe our efforts related to five agreements the United States currently is implementing.

First, the Montreal Protocol. As you are aware, during the 1980's, indeed, the United States led a global effort to negotiate an agreement to phaseout the production and consumption of substances that deplete the ozone layer and threaten human health with the deliberating effects of skin cancer and cataracts. Over the last 15 years, the implementation of the Protocol and its subsequent amendments have yielded remarkable progress in protecting the stratospheric ozone layer by phasing out much of the consumption and use of ozone depleting substances on a global scale. The protocol does include a multilateral fund to provide financial and technical assistance to developing countries to assist them in meeting their own obligations under the treaty. As the largest contributor to the fund, the United States has made available over $350 million to the fund since the beginning.

The second treaty I would like to discuss is the Convention on International Trade in Endangered Species of Wild Fauna and Flora, known as CITES. CITES conservation goals are to restrict international trade in endangered species, and assist countries toward a sustainable management of species through international trade.

CITES Parties regulate wildlife trade through controls and regulations on species listed in three distinct appendices. In addition, each Party must appoint a CITES management authority and scientific authority. Of course, for the United States it is the Fish and Wildlife Service at the Department of Interior that provides us with the management authority and scientific authority for CITES. That agency also plays a major law enforcement role in its implementation.

With regard to implementation, the U.S. implements CITES primarily through regulations developed under the Endangered Species Act and also under the Lacey Act. The United States is proud of its record in implementing CITES. We are at the forefront of CITES Parties in fulfilling these obligations.

Third, I would like to just briefly touch on the U.N. Framework Convention on Climate Change, which I know you are very interested in. The Framework Convention creates a broad global framework for addressing the challenge of climate change. My colleague, Jim Connaughton, will discuss the overall approach of this Administration to address this serious global challenge. Let me just briefly refer to a portion of this strategy where I believe the United States is demonstrating superb leadership.

In the two major announcements of President Bush on our policy regarding global climate change, he committed us to intensifying efforts with other nations to address the challenge of climate change. Toward this end, the United States has initiated a series of bilateral climate change relationships with important partners, including, and I would like to mention them, Australia, Central America, the European Union, Canada, China, India, Italy, and Japan. We have discussions underway on additional relationships with Brazil, Mexico, Korea, the Russian Federation, South Africa, and the Ukraine. Including the U.S.' participation, these relationships would represent 78 percent of the total greenhouse gas emissions from the combustion of fossil fuels around the world.

Fourth, let me just mention the North American Agreement on Environmental Cooperation, commonly referred to as the NAFTA environmental side agreement. This serves as an important framework for cooperation among the three North American governments on a wide range of environmental efforts. Among other things, the NAFTA side agreement established the Commission on Environmental Cooperation, the CEC, which coordinates such cooperation.

This agreement has promoted strong cooperation among the three countries on a number of important environmental issues, achieved primarily through the implementation of the CEC work program funded at the level of $9 million annually where each party contributes equally. These include the promotion of enforcement and compliance with environmental laws, protecting children's environmental health, protecting animal species that migrate throughout North America, and minimizing the use of persistent toxic chemicals such as DDT.

Fifth, and last, Mr. Chairman, let me just touch on the U.N. Convention to Combat Desertification, CCD. Indeed, I would like to thank you, Senator Jeffords, for your leadership in the ratification of this important global measure. As you are aware, this Convention arose out of the 1992 Earth Summit. The purpose of the Convention is to combat desertification and mitigate the effects of drought on arid and semi-arid lands through effective local, national, regional, and global action.

The Convention's central objective is to promote the sustainable use of dry lands worldwide, but especially in Africa, and to make more efficient use of aid resources, thereby helping to solve Africa's and other affected regions' chronic hunger problems and availability of fresh water. Many of the principles used in the U.S. over the past 70 years have been incorporated in the language of the CCD.

In conclusion, let me observe that while significant progress in protecting the environment has been made, we are all aware that enormous challenges lie ahead. And as you have noted, Chairman Jeffords, the upcoming World Summit on Sustainability in Johannesburg, South Africa, provides the United States with a unique opportunity to take stock of our past accomplishments and to build on them in helping to advance economic and social environmental stewardship.

We have learned a great deal since Rio. WSSD gives the United States a chance again to demonstrate its leadership, to create a

new paradigm that stresses sound economic policy, national capacity for good governance, anti-corruption, transparency, the role of science, poverty reduction, and sound environmental stewardship. Working with our international friends and allies, the Bush Administration is committed to the success of the Johannesburg Conference to ensure we all work together to build a positive legacy of natural resources sustainability for current and future generations of the global citizenry.

Thank you Chairmen. I would be happy to respond to any questions you may have later on.

Senator JEFFORDS. Thank you very much.

Now we will hear from Mr. Connaughton, Chairman of the White House Council on Environmental Quality. Please proceed.

STATEMENT OF HON. JAMES CONNAUGHTON, CHAIR, WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY

Mr. CONNAUGHTON. Thank you Chairman Jeffords, Chairman Sarbanes, Senator Chafee. I want to note at the outset, Mr. Chairman, your reference to NEPA. Certainly, I share your view that NEPA was the original sustainable development statute. And the fact that it has been adopted by I think more than 50 countries worldwide and the legacy that that articulation of what sustainable development is about is sort of a test case for the beginnings of American leadership in this area.

Of particular note in that statute, and I think we had talked about this a little bit during my confirmation hearing, is the concept of man and nature living together in productive harmony. That is an important concept. And this hearing today, actually bringing together the Senate Environment and Public Works Committee and the Foreign Relations Committee, I think is a key important next step as we get various committees of jurisdiction looking across their lines, as we must, consistent with your statement, to figure out how to better integrate our environmental and our social objectives into our other policies and into other activities. That is really what was behind the spirit of NEPA. And I think that is why today's hearing is so important and useful, because it then turns, Chairman Sarbanes, on what you referenced, that the largest questions before us are the questions of implementation: are we implementing at the domestic level and equally, and perhaps today even more importantly, at the international level; and where are the important places where we can make meaningful progress on implementing these documents that were so hard worked over. So I look forward to our discussion today.

What I want to do is briefly spend some time talking about where we are with implementation of the U.N. Framework Convention on Climate Change and then throw in just a little aside on the world summit, my own view with respect to the upcoming World Summit on Sustainable Development.

With respect to climate change, President Bush has committed the Nation to ambitious, yet realistic, goals that are based on a set of six principles that largely derive from the framework that we have set out in that Convention. First is, consistency with the long-term goal of stabilizing atmospheric concentration of greenhouse gases at a level that would prevent dangerous interference with the

climate system. This, of course, refers to the fundamental long-term obligation under the Convention, to which the President has reaffirmed our Government's strong commitment. Second is that we should proceed with measured actions as we learn more from the science and build on it. Third is the concept of flexibility, to adjust to new information and take advantage of new technology. Fourth is ensuring continued economic growth and prosperity without which we actually cannot make the kinds of investments that we will need to over the near-to mid-term to achieve our greenhouse gases emission reduction goals. We need to pursue market-based incentives that will spur technological innovation. And finally, and very importantly, is the concept of global participation along the lines that my good colleague John Turner just described. We need to find ways to engage the developing countries in a constructive path, on a path whereby they, too, can make meaningful progress together with their international partners.

The President has set a goal, a near-term goal, which is committing the Nation to an immediate goal of reducing America's greenhouse gas emissions relative to the size of our economy by 18 percent in the next 10 years. This goal is comparable to the kinds of emission reductions that countries participating in the Kyoto Protocol expected to achieve. We believe that this way of articulating progress is a means by which we can open a dialog with developing countries because it is consistent with their need for economic growth, but to do it in the kind of efficient and more productive way that we ourselves continue to demonstrate leadership on in the United States of America.

Importantly, it will set us on a path to slow the growth of our emissions. Our emissions are growing. Emissions around the world are growing. A key first step in making meaningful progress on climate change is to, in fact, slow that growth significantly and, as science justifies, to stop the growth in emissions, and then reverse that growth. This will require a sustained commitment and significant investment and effort from our Nation's farmers, small businesses, workers, industries, and, most important, individual citizens. In recent time, the largest growth in emissions have resulted from the actions of individual citizens in their homes, in their transport, in their commercial activities. We need to be working on incentives and education and other methods, we have a whole series of programs, by which to engage the American citizens of the whole toward this effort.

The President's policy recognizes that meaningful progress depends on the development and deployment of new technology. That is key. We all recognize that. There is a large international consensus on that. We need to advance the science further because there are key gaps in our knowledge that can help us make smart policy choices in the near-and mid-term. We need to develop and promote energy efficiency, conservation, and sequestration technologies and practices in addition to building on international cooperation.

What I would like to do is just quickly run through the various components, and I will just take a minute to do that. The President's fiscal year budget calls for a $700 million increase in our Federal effort in regard to climate change. That will support a $4.5

billion program of research on climate science and energy technology and create significant new incentives that will help advance those technologies and deploy them. That is unmatched in the world. We are committed to a program of up to $7.1 billion over the next 10 years that is dedicated to technology development and the incentives to deploy that technology. That, too, is unmatched in the world.

Senator Jeffords, you were a strong supporter of a strong conservation title in the Farm Bill, as was the Bush Administration. That will unleash up to $49 billion, a significant portion of which is going to enable and incentivize our farmers on their working lands and our ranchers on their working lands to engage in the kind of sequestration activities and smarter land management that we would like to see while not putting them off their property. We far outmatch anything along those lines in the rest of the world.

That said, I want to note that we have the upcoming World Summit on Sustainable Development coming up in Johannesburg. We have a real opportunity to forge the kinds of partnerships that will in fact implement the rich tapestry and body of international norms and international treaties and laws that we have all committed to over the last couple of decades. We are looking forward to really setting off a dialog around which we can in fact make meaningful progress on each of those commitments and come up with real partnerships that can demonstrate measurable success. So, again, we look forward to talking to you about that today. Thank you.

Senator JEFFORDS. Thank you both.

Senator Corzine, do you have a brief statement you would like to make?

Senator CORZINE. I will have one for the record, but thank you. I appreciate your holding the hearing.

Senator JEFFORDS. Thank you.

Mr. Turner, President Bush attended the Earth Summit in 1992. I understand that more than 100 heads-of-state plan to attend the World Summit in Johannesburg. Will the President lead the United States delegation to the World Summit?

Mr. TURNER. Senator, there is obviously considerable interest around the world as to who will head the U.S. delegation. All I can tell you is that decision has not been made yet. I can tell you that the commitment to make the World Summit a success has captured the interest of the White House, the National Security Council, cabinet members, and the agencies. So we are committed to see that we have a dynamic and bold agenda as we go to Johannesburg. But the decision on who would lead the delegation has not yet been made.

Senator JEFFORDS. I just hope the President can because I think it would be very, very helpful to the world.

Mr. Connaughton, in preparation for the Earth Summit of 1992, CEQ held a series of regional public conferences around the United States and compiled extensive documentation based on the concerns presented at these public meetings. What comparable effort has CEQ undertaken in preparation for the World Summit?

Mr. CONNAUGHTON. I will speak to the process point and then turn to the substance point. We are jointly working with the State

Department and have coordinated a fairly extensive interagency process to ensure that as we get to the World Summit we actually have broad agency participation in that effort. That is the immediate process and we have been working on that.

In terms of the outreach, the first Rio Summit actually was critical in setting the agenda and setting the numerous areas in which we needed to make meaningful progress. Whether it is reducing the number of people without access to safe drinking water, whether it is reducing the number of people without access to clean, reliable, affordable energy sources, issues such as biodiversity and the like, all of those have unfolded in the last 10 years through quite extensive both national and international dialog. So where we are today is very different from where we were 10 years ago, and where we are today is with this very complete agenda, whether it is Agenda 21, or whether it is the Millennium Goals. We have this very rich agenda. If anything, the level of outreach on an agency-by-agency basis, and certainly with the State Department through our international fora, we have more fora engaged in the subject of sustainable development than anyone might have in fact imagined in 1990.

Our effort, and certainly CEQ's push, what we are trying to emphasize is can we in fact forge the kind of partnerships with respect to these commitments that have now developed and that we have held ourselves to, can we forge the kind of real concrete partnerships where 2 years from now, 3 years from now, 5 years from now we can actually say that with respect to our commitment, for example, on access to safe drinking water we have real plans toward making meaningful progress on each of those goals. And so that is where my office has come in and will stay diligent on that, because also I think it is important to emphasize with the World Summit, just as Rio was not the end of the conversation, it was actually the beginning of the conversation, we would like to see this World Summit be the beginning of a very new and hard emphasis on really implementing our goals toward lifting the world out of poverty and assuring for them the kind of quality of life that we enjoy here in America.

Senator JEFFORDS. Mr. Connaughton, the Framework Convention commits the United States and all the Parties to reporting detailed information on its policies and measures "with the aim of returning individually or jointly to their 1990 levels of these man-made emissions of greenhouse gases." Which of the programs outlined in the Administration's Climate Action Report aims to return our emissions to the 1990 levels, and by when?

Mr. CONNAUGHTON. The Action Report, which, as you know, Senator, goes on at great length, outlines more than 60 Federal programs and mentions numerous activities at the State and local level, all of which are oriented toward mitigating greenhouse gas emissions. In addition, we have an extensive program of research and development and technology deployment, not just on the pure technology side, for example, in sequestration and how we can capture carbon, but also in the land management side of things in terms of how we can better utilize our natural resources and the acreage that we have in the United States toward meeting our Nation's agricultural and wood products and other needs.

That set of programs covers every sector of the economy. It includes a range of mandatory measures, a range of voluntary measures, a range of incentive-based measures. And, again, when you sort of line it up program for program, it is a level of effort that far outpaces much of what the rest of the world is currently doing.

In terms of a timeline of when, we cannot set one. I think the non-binding aim of the Framework Convention was not met by the United States or by most of the rest of the developed nations of the world. I think we need to set ourselves on a realistic course, consistent with economic growth, by which we can all make meaningful progress toward that long-term goal of stabilization of greenhouse gases in the atmosphere.

Senator JEFFORDS. I am sorry, but the question is, which ones aim at 1990?

Mr. CONNAUGHTON. The entire package aims at reducing the growth in our greenhouse gas emissions, Senator. There is no particular silver bullet program by which we could achieve that goal.

Senator JEFFORDS. Senator Chafee.

Senator CHAFEE. Thank you, Senator Jeffords. I have a little bit of business. Senator Hagel, a member of the Foreign Relations Committee, asked me to submit for the record his opening statement.

Senator JEFFORDS. It will be accepted, without objection.

[The prepared statement of Senator Hagel follows:]

STATEMENT OF HON. CHUCK HAGEL, U.S. SENATOR FROM THE STATE OF NEBRASKA

Mr. Chairman—Thank you for holding this hearing. This is an opportunity for the Administration to discuss the progress that has been made on these five environmental treaties, all of which have been ratified by the U.S. Senate.

Of course, much of the talk today is also likely to focus on a treaty that was signed by President Clinton but never submitted to the Senate, the Kyoto Protocol.

I would like to remind my colleagues of a bit of Senate history on this issue.

Tomorrow will mark the 5-year point since the Senate voted unanimously to provide President Clinton and Vice President Gore with clear advice regarding the Kyoto Protocol. It is unfortunate that the Clinton Administration ignored the Senate's 95–0 vote on S.Res. 98, or the Byrd-Hagel Resolution, but the conditions outlined in that resolution remain the guideposts for U.S. international climate change policy.

I would also remind my colleagues, and this frequently gets forgotten in the discussion, perhaps even more significant than the 95–0 vote was that the Byrd-Hagel Resolution had 65 bipartisan cosponsors.

As we know, the Byrd-Hagel Resolution was very clear. It called on the President not to sign the Kyoto Protocol, or any other international climate change agreement, unless two minimum conditions were met.

First, S. Res. 98 directed the President not to sign any treaty". . . unless the protocol or agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period." The message was simple. Yet as we know, the Kyoto Protocol does not include a single developing nation. These are the very nations, such and China and India, that will soon lead the world in manmade greenhouse emissions. Any treaty that exempts them from participation is folly.

Second, the Resolution stated the President should not sign any treaty that". . . would result in serious harm to the economy of the United States." The Kyoto Protocol would have legally bound the United States to reduce our greenhouse gas emissions to 7 percent below 1990 levels by the years 2008 to 2012. As President Bush stated in February, this would have cost the U.S. economy $400 billion and resulted in the loss of 4.9 million jobs.

The Clinton Administration never submitted it to the Senate for debate and consideration. I suspect it is because they knew what is still true today—if put to a vote in the Senate, the Kyoto Protocol would face resounding defeat.

Other nations are also reconsidering their early ardent advocacy for the Kyoto Protocol. Japan has ratified the treaty, but has no enforceable plan to meet its obligations. The same is true for the European Union. Australia has joined the United States in saying it will not ratify the protocol. Canada and Russia have not made final commitments to ratification.

The Kyoto Protocol is collapsing under the weight of the reality of its economic consequences.

Does that mean the United States should turn its back on international efforts to address potential climate change? No, that would be irresponsible.

In his February 14 announcement of the Administration's climate change policies, President Bush stated, "I intend to work with nations, especially the poor and developing nations, to show the world that there is a better approach, that we can build our future prosperity along a cleaner and better path."

he Administration has backed up the President's words with funding and tangible international cooperation. I'm sure the witnesses here today will expand on these efforts and I look forward to their testimony.

Next month, nations will gather for the World Summit on Sustainable Development in Johannesburg, South Africa. We should stay focused on science, programs and resources that enhance international cooperation to produce tangible environmental benefits for all nations. Not worn-out debates over dead treaties.

Thank you, Mr. Chairman.

Senator CHAFEE. Thank you. Mr. Turner, to follow up on the Summit in Johannesburg, what are the goals that we will be setting out for us as we attend this summit? What do we hope to accomplish?

Mr. TURNER. Senator, I think we are committed to success. And then you are asked the question, how will we measure success? I think we will measure success by getting some commitments to concrete actions by the world community to make a difference in places around the world. By that, I think the United States is advancing themes based on the need for good governance, the need to increase the total flow of resources to eradicate poverty and lift the quality of people's lives. We need concrete commitments. In fact, the United States is working on deliverables in the following areas. The three most important seem to be: Access to energy. We have great opportunities in providing clean energy technology. It is inexcusable that we have almost 2 billion people today without access to fresh water. So I think water will be a priority. Third, the problem of HIV/AIDS and other infectious diseases. So, health, fresh water, and energy would be the top three areas for deliverables. We are also working on packages in forestry, oceans and fishery biodiversity, food security, and education. We feel this package helps invest in people, it helps build a platform which will not only help economic growth but environmental sustainability.

So I think our opportunity is to get beyond lofty rhetoric, the negotiation of text, and get into real partnership commitments. We have an ongoing dialog with other countries, both developed and developing, trying to forge these partnerships, a dialog with the nonprofit community both domestically and internationally, and business groups to see if for the first time we can build on a continuum offered us by the Doha Conference on Trade, the Monterrey Conference, to increase the total flow of resources to impoverished areas of the world. Johannesburg is an opportunity to bring this all together with real concrete commitments. The United States, I have to say, is really leading that international effort right now to forge those commitments.

Senator CHAFEE. Very good goals to have for the conference. I support them and wish you good luck at building consensus with

other nations around the world. Certainly health and fresh water and curtailing the spread of infectious diseases are a good place to start and help build an economy. So I will certainly be supportive of those efforts.

Mr. Connaughton, in your statement you talk about measured actions as we learn more from science. I am curious as to when does the science finally convince the Administration to take action. Where is the Administration on global warming in relation to the science? Is it a little apprehensive of it at this point, or beginning to come to the point of this is an issue that needs aggressive action?

Mr. CONNAUGHTON. Where we are with the science is there is a significant scientific enterprise that has produced a number of projections that are sufficient to give us cause for action. The issue is are we calibrating our action to the current state of the science. I believe the President's plan does precisely that in terms of taking us to the next step of slowing the growth in emissions and yet not taking us so far down the road, given the uncertainties of the science, that we are actually having significant detrimental effects on jobs, the American workers, which is important, and it is not just American workers, but it is the kinds of effects that you would see with quite restrictive actions in other countries of the world.

So when is the science done? We have had a couple of decades of scientific enterprise. We are looking at many more decades, funded with the U.S. carrying the largest share of that funding, in which we have to stay on top of this. Our research effort in climate change, again, it is unmatched in the world and it far outpaces our research in many other areas of more immediate consequence to people in the United States of America. But it is important enough to stay up with the science.

What we are trying to do, though, is we are trying to get a more focused management program to some of that spending, not all of it, but some of that spending so it can actually begin to answer some of the more difficult questions that help us design programs that would be meaningful. We need to know more about some of the effects of, for example, the effects of aerosols, the effects of clouds, the effects of changes and adaptations to climate. We need to know more about that in order then to develop the kinds of policies that do not lead us to significant economic mistakes. Because, of course, if we put our economy further into reverse, we actually will not get the kinds of investments we need to make the progress toward that next generation of capital that we need to deploy to get new capital stock, to get the new cars everybody wants, to get more efficient manufacturing, and, importantly, more efficient homes and more efficient commercial enterprises, because that is where the real growth is.

Senator CHAFEE. Thank you very much.

Senator JEFFORDS. Senator Corzine.

Senator CORZINE. Thank you, Mr. Chairman. I would like to take a little bit of what you just said, Mr. Connaughton, and ask whether you think that some of the capital investment that I think we all think is important for generating economic growth is somewhat inhibited because there is an uncertainty and a conflict between what we sense are requirements of our international obligations

and both the political debate that we have in America about climate change and the uncertainty that seems to revolve around what certainly I read in our international requirements. For instance, I would cite under Article 3.3 of the Convention, talking about the Framework Convention on Climate Change, "Parties should take precautionary measures to anticipate, prevent, or minimize the causes of climate change and mitigate its adverse effects where there are threats of serious or irreversible damage. Lack of full scientific certainty should not be used as a reason for postponing such measures."

Sometimes it does not feel that our policies are taking into account what we have as mandates, at least in some sense, from our international conventions. I would think as an investor in dealing with some of these needs that people might be confused, particularly as they see increasing evidence published that some of these considerations, particularly with regard to carbon, are a serious problem.

How is the United States resolving this sort of dilemma of debate that exists in the context of what our international obligations are? Not only yourself, but Mr. Turner as well, I would like to hear your comments on that.

Mr. CONNAUGHTON. First, I think that the President's announcement on February 14 was a key next step in providing further clarity that you describe, Senator, in terms of making clear at least what this Administration's expectation is on the greenhouse gas side of the equation in terms of a realistic but still ambitious goal for further efficiency and productivity in our economy. That is our expectation.

The second component of that, which has to do with perhaps the investment uncertainty you describe, is we look very closely at the approach that certainly Senator Chafee championed, that numerous members of the Senate championed, toward not just getting our information flows better in terms of improving our registry of reductions in the various sectors, but also to create a credible crediting system by which those who do make investments today have some high level of assurance that those investments will be recognized in whatever a future policy could hold, whether it is an incentive-based policy, whether it is a market-based policy, which we would emphasize as the better path forward, or through even additional mandatory programs that might come to the fore in terms of where we are falling short of real action.

Senator CORZINE. Is the White House supporting the Brownback-Corzine amendment on registry of carbon dioxide emissions?

Mr. CONNAUGHTON. We do not support that because we do not think there is a need for at this time a mandatory reporting element. We think enhancing the registry is a great idea. I would think creating——

Senator CORZINE. As you know, it is not mandatory for the first 5 years as long as we meet some kind of reduction standards, and would not become mandatory if people met those standards.

Mr. CONNAUGHTON. I am aware of that and that is our point of departure.

Mr. TURNER. Senator, I want to respond and just offer some reflections of a trip I just returned from. China was my first trip and

a real learning experience, where we completed some high level dialog with China on a diverse array of environmental issues, and then I was able to travel through China. China, to me, was a great reflection on the broader approach and its justification that the United States is taking in engaging countries like China and India and others that will represent a significant amount of emissions.

I was impressed in going to China that that is a country on the move economically. To improve the lives of their citizens, their energy consumption is going to go up exponentially. Their technology and science is extremely poor, and they are the first to admit that. The emission of greenhouse gas is significant. They are making a significant effort but the utilization is not good and not efficient. So there is an excellent opportunity for the United States to take science, to take technology and partnership with them.

I went to one of the poorest regions in China where they have some significant desertification and erosion, over-grazing, dust issues. They admit it, as our science admits it, that the dust is now coming all the way across the United States from the Mongolian-Tibetan plains of China.

We have been accused of being isolated on global climate. I submit the absolute opposite is true. The United States in fact is leading the effort to engage the developing world in this dialog and approach to collective strategies on climate. That impact has significant opportunities to address this serious issue. We need to do much more in our international efforts, but the United States is really leading, trying to get the attention of the President's commitment to engage other nations in this whole effort on climate.

Senator JEFFORDS. What did you mean by trying to get the President's attention?

Mr. TURNER. No, excuse me, Mr. Chairman. I mean in trying to follow through on the President's appropriate commitment of the United States. Part of our strategy is to work with other nations, engage other nations in approaches to the serious issue of climate. As you know, Mr. Chairman, the Senate voted, and the President concurred, that one of the failings of the Kyoto process was we were leaving out too many countries, members of the world community that not only today emit a lot of greenhouse gases, but the potential for significant increases in the future based on old technology really has frightening ramifications for where we go in climate. So I am proud of what we are doing to engage other countries, especially the developing countries.

Senator JEFFORDS. I am very interested in this. I was in China and I started an organization dealing with more efficient use of energy. They sent some men over who looked at China's incredible need. To just improve the technology, they could reduce their emissions immensely. What does the United States intend to do to try to get these countries to be more efficient in their use and to reduce greenhouse gas emissions?

Mr. TURNER. Senator, obviously, in our discussion with other countries, their needs and interests are different. But it is a spectrum going from providing science and technology, which seems to be the biggest need, to, as Mr. Connaughton referred to, the need for more information; i.e., climate research. We have committed to a global climate research system. And, again, the United States is

leading that effort to answer many of the legitimate questions that we still have out on climate change, and we are partnering with other countries in setting up global monitoring stations. I visited a very remote one we put up in China. So science and technology, global research, looking at opportunities to comment together and work on global policy.

Japan, as an example, we have three working groups on research, science and technology, and how together we can go out and help developing countries, and then looking at future markets, which is business opportunities for both countries. In India, for an example, Mr. Chairman, India, it is astounding to me that we have 600,000 women dying each year from indoor air pollution from the use of pre-industrial fuel use, poorly ventilated stoves. So India's need for new types of energy for basic heating and so forth, that is unique to India.

So each country has unique opportunities for the United States to take its research, its technology, engage the private sector, engage the nonprofit community, engage the academic community. There are so many significant needs out there in the world that I think it will be an opportunity for the United States to contribute significantly to where we go in the coming decades on climate change.

Mr. CONNAUGHTON. Senator, if I might add.

Senator JEFFORDS. Yes.

Mr. CONNAUGHTON. The Monterrey consensus by which we are trying to create harder criteria for countries we think can be successful is also important to this overall enterprise. We need to create the kind of economic, social, and political environment in some of the developing world in some of these larger developing countries by which we can actually get the kind of long-term investment that we enjoy in the United States, which, as you know, tends to deliver the better technologies. If you are in an unstable environment, if you are in an environment where capital is not protected, if you are not engaged in the international trade world by which you have to become competitive on efficiency and productivity grounds, you just will not get those kinds of investments that will turn things around faster.

So I do not want to leave off the other programs that do not necessarily obviously have the effect that we are discussing in terms of the environmental dimensions of that. But from an environmental perspective and also from a greenhouse gas perspective, those agendas are really critical toward making real progress on a much shorter time line in some of these countries toward environmental protection. And it opens the door for the kinds of very rich dialogs we have going on right now, but it will open the door for even more consequential dialog as we are able to share technical capacity, share regulatory mechanisms, the ones that work, the ones that do not work, and maybe help them leapfrog through some of our lessons as we now get to a more streamlined, more market-based system of addressing some of our issues.

Senator JEFFORDS. A question for both of you. What are the top three U.S. substantive priorities for the Summit of clear sustainable development outcomes? What do you think the Summit will

achieve in terms of real sustainable development results at home and abroad?

Mr. TURNER. Mr. Chairman, I think I would answer that in a couple of ways. The top three sectoral areas that we have opportunities to make commitments in are I think, as I mentioned, in the area of fresh water, health, and the availability of energy. A more thematic approach, I think it is an opportunity to implement the realization that taking care of the environment starts with taking care of people, the opportunity for the United States to reduce poverty around the world. And third, I think we have an opportunity to change the way we have traditionally done assistance around the world, and not just economic assistance for developing nations, but to in fact incorporate a new theme where we help countries help themselves with better ruling capacity, help them invest in their own people, help them encourage entrepreneurship and involvement of the private sector.

So I think we have an opportunity to build a new paradigm of partnerships out around the world.

Senator JEFFORDS. Mr. Connaughton, why do you believe that the more environmentally sound EPA straw proposal on multipollutant legislation was rejected by the White House?

Mr. CONNAUGHTON. That was an initial straw proposal that then went through extensive analysis, economic analysis, feasibility analysis, toward what we think is a quite strong proposal, a 70 percent reduction in the three criteria pollutants, sulfur dioxide, nitrogen oxide, and mercury, but is also one that is attainable. We can go quite far, Senator, as you know, but we can do it in a way that keeps us within the realm of not having an impact on consumers, making unprecedented strides in terms of the environmental protections that that would deliver and do it on a timeline by which the economic community can actually make investments toward these leapfrogging efforts and give them the long-term certainty with their investments where they can actually do some significant capital planning. So there were a number of factors that came into our policy that led us to a different place, but not a markedly different place.

I would also note, and I want to emphasize because it comes up frequently, the issue of coal. Coal represents 50 percent of electricity generation today. Coal is affordable, it is reliable, and it is here, it is domestically secure. But what we need to do is we need much cleaner coal-fired generation. The way you do that is to create the right kind of incentives, and we have got a lot of money on the table toward clean coal technologies as part of our climate policy as well as part of our air policy, but you also then need to create the kind of timelines so that the plants can turn over in a way that makes sense to business investors so that they will actually invest in the application of these technologies. As you know, Senator, it is quite exciting the technologies that are potentially available. If we create the right timeframe, make the levels economically reasonable, we think we can spur the investment toward the application of those technologies, the broad application, which then preserves a role for coal even as we continue with a more diversified energy system.

We need more nuclear, we need more natural gas, we have to look to solar wind and some of these other renewable technologies in which we have quite a strong commitment. But we should not lose sight of the incentive we have, not just for the United States, because if we can advance coal technologies in the United States, then we can take them to places like China where they are not going to be creating massive wind farms to address their energy needs. And they are putting in a lot of baseload capacity. It would be really helpful for us to take our success here and take it international.

So a whole lot of factors went into it and we really did try to look at this holistically and consistent with our overall energy and economic goals. We think we hit the right balance.

Senator JEFFORDS. Mr. Turner, is the U.S. prepared to agree to seek higher appropriations in the outyears to replenish the global environmental facility GEF in order to leverage other donors?

Mr. TURNER. Mr. Chairman, as you are aware, the President committed us to I believe $178 million on the GEF, realizing this is an important outreach especially in developing countries. So for the first time we recommended catching up with our arrears and adding in $70 million for the first time.

Currently, the third replenishment negotiations are under way and we plan to participate in those in a dialog with the world community to see where the world wants to go next. The focus of the GEF is extremely important to the United States. But I am pleased that we made a significant increase in our request to the Congress on the GEF. The consideration of the next round is under review.

Senator JEFFORDS. I am pleased to hear that. It seems like this would be necessary to fully implement the Convention to Combat Desertification and the Stockholm Convention on Persistent Organic Pollutants and the prior informed consent Convention. So I appreciate that information.

For both of you. The Senate-passed Sense of Congress on Climate Change, Section 1001 of the Energy Policy Act of 2002, says the U.S. should take responsible actions to ensure significant and meaningful reductions in emissions of greenhouse gases from all sectors, and take part in international negotiations that lead to U.S. participation in a fully binding climate change treaty. Is the U.S. presenting anything at the World Summit in terms of clear targets and timetables for addressing climate change and reducing emissions consistent with this?

Mr. CONNAUGHTON. With respect to the World Summit, first off, climate change will be discussed but it is not an agenda for action because just a few short weeks later the Conference of the Parties will be meeting again. And so there is a separate international meeting to continue to carry out the discussions under the Framework Convention and under the Kyoto Protocol.

With respect the first point, I think the answer to that is yes, we are moving forward with the kind of international bilateral and multilateral process that Assistant Secretary Turner outlined for you to, in fact, re-engage, since we are not participating in the Kyoto Protocol, engage outside of that particular forum to come up with common strategies, again, not just domestically but with our international partners, including other countries who may or may

not become part of the Kyoto Protocol. So we are not waiting for decisions on that to take the kind of action that that resolution urged.

We remain guided by the precursor resolution that we need to have an approach that does not significantly impact the economy, and also an approach that does engage developing countries, which were the two key pieces that were missing. So we remain guided by that as well. And we are looking forward to seeing significant progress. I would note that the President's commitment of an 18 percent reduction in greenhouse gas intensity, that alone in 2010 would result in 100 million metric tons avoided from business as usual, which is quite a consequential amount of tons of carbon avoided. We think that also is consistent with the spirit of the Senate resolution.

Senator JEFFORDS. As you both know, I have deep concerns over the way we are handling the results of pollution from our power companies. Have you been involved in any of the decisions related to the release of the New Source Review documents to the Congress or in discussions of adopting a new policy and providing less information to Congress? That is kind of a little nasty question.

Mr. CONNAUGHTON. First of all, yes, the New Source Review policy was the—EPA was directed under the National Energy Plan, in consultation with the Department of Energy, to prepare the report on the impacts of the New Source Review program on electricity supply. So that was a joint exercise between the two agencies in which the various White House offices, as part of our interagency process, we were apprised of its progress and where that was heading.

In terms of the recommendations that came from EPA, there too, consistent with other processes, EPA kept us informed of where that was going. We had extensive interagency conversations about the various recommendations that EPA was considering. The end product was produced by EPA and then was received back into the interagency process to see what it meant.

When EPA's regulatory proposals to implement the recommendations are complete, those will come over to the Office of Management and Budget and, consistent with our traditional processes, those will receive interagency review as well, as do all other significant regulations, and we expect to be a part of the review of the regulations at that time.

In response to your final point, the dig on information, we understand you had information requested out to EPA and they got some information to you and others not to you on quite the timeframe you expected. But it is my understanding that the large body of that has made it up to the committee. And so while I suppose we could talk about timelines for getting it to you, it is my understanding it has made its way to you. So, if there is more to discuss on that, I would be happy to do what I can and talk to EPA.

Senator JEFFORDS. I cannot tell you how disturbing it is with that particular issue, which is a life-saving issue, as you well know, that we have had such troubles in that regard. So I appreciate that.

There are other Senators who could not be here today because of their busy schedules, and thus they will have the opportunity to

submit questions to you to be responded to in writing. So I just want to let you know that. I also want to thank you very much for being here today and candidly participating in our question and answer period.

Mr. TURNER. Mr. Chairman, thank you for your time, and Chairman Sarbanes, and your interest in giving the Administration the opportunity to discuss a very important subject matter, and that is the implementation of our international obligations. So thank you, Mr. Chairman.

Mr. CONNAUGHTON. Thank you, Mr. Chairman.

Senator JEFFORDS. Thank you both.

We will now move on to our next panel. Our first witness is the Honorable Maurice Strong. He is a native of Canada and resides in Buckhorn, Ontario. Mr. Strong has long-standing ties with the private and public sectors and has served in an impressive array of business, government, and nongovernmental organizations. Currently, Mr. Strong is a Special Advisor to the Secretary General of the United Nations, President of the Council for the University for Peace, a Senior Advisor to the President of the World Bank, and Chairman of the Earth Council. Mr. Strong was the Secretary General of the 1992 United Nations Conference on Environment and Development, and the 1972 United Nations Conference on the Human Environment, and subsequently became the Executive Director of the United Nations Environmental Program.

Mr. Strong, thank you for traveling all the way from Canada to be here with us today. Let me introduce the other two on the panel and then we will start with you for a statement.

The second member of the panel is Mr. John Dernbach. He is a professor of law at Widener University Law School. He is editing a book, "Stumbling Toward Sustainability," that assesses progress the U.S. has made on the sustainable development in the past 10 years and recommends the next steps. Welcome. We look forward to hearing from you.

Also, we have Christopher Horner, who serves as a Senior Fellow at the Competitive Enterprise Institute, and as Counsel of the Cooler Heads Coalition. That sounds like what we need.

Please proceed, Mr. Strong.

STATEMENT OF HON. MAURICE STRONG, CHAIRMAN, EARTH COUNCIL INSTITUTE CANADA, TORONTO, ONTARIO, CANADA

Mr. STRONG. Distinguished Chairman, Senator Jeffords, Senator Feingold, ladies and gentleman. First let me congratulate you, Senator Jeffords, on your leadership on these issues and say what a privilege it is for me to have the opportunity of testifying before these two important committees of the U.S. Senate as you consider issues which are at the center of my own life interests and concerns. It is particularly encouraging to know that you are addressing these issues at a time when the position of the United States of America in respect to these issues has never been more important to the human future.

The United States has been at the center of the movement to develop since the first Stockholm Conference first put these issues on the international agenda an international regime of cooperation and of institution-building to deal with the dilemma which Stock-

holm revealed. The fact that through our economic life we are impinging on the resource environmental and life systems on which the future of all life on earth and, indeed, our economic welfare also depend.

And as we move toward the World Summit on Sustainable Development in Johannesburg that will meet next month, these issues have special importance. Because if we fail at that conference to reignite the momentum that we achieved at Rio de Janeiro 10 years ago, I do not know when that momentum is likely to be rejuvenated. So I am deeply encouraged by these hearings and pleased and grateful at the opportunity you have provided to hear some views. Those views are primarily reflected, Mr. Chairman, in my written presentation. I have to say, I got your invitation when I was down in Central America, so I had to do it rather hurriedly. But I do hope they will help to amplify some of the comments I will now make briefly.

The recent retreat by the United States from much of its long stand role as the leading driver of these issues, as particularly evidenced by its withdrawal from the Kyoto Protocol of the Climate Change Convention, threatens the progress that has been made in collaborative management of our environmental problems in the past thirty years and the prospects for further progress that is so essential for our future. And let me say, Senator, I probably have spent as much time in my life in the United States as I have in my home country. I think I have paid more taxes here than I have in my home country.

Senator JEFFORDS. We appreciate that very much.

Mr. STRONG. So I come here as a friend and admirer of all things American. My comments are expressions of my concern, not to be taken as criticism, but expressions of concern that I believe reflect the concerns of many Americans and people throughout the world concerning the nature of the U.S. position on these issues. They have indeed cast a cloud over prospects for the World Summit on Sustainable Development which will convene next month in Johannesburg.

What the United States does or fails to do matters, Chairman, as you so well know, and that is why you have convened these hearings. It matters immensely. Not only in substance, but in example. As the most powerful nation in the world, indeed you are a nation that gives a signal to others. Therefore, any withdrawal of your commitment to international negotiating processes and to the agreements that have been reached over so many years really does undermine the very fabric of international cooperation and the international legal system, which the United States itself and the whole world owes it a great debt of gratitude, Senator, for its leadership in these past thirty years in developing that framework. It is still far from perfect. We cannot allow it to slip back.

So I am really encouraged by these hearings that you are focusing now on the whole process by which the United States, yes, and others, have performed under existing commitments and decisions of past conferences. There is a whole spectrum I do not need to elaborate. There are agreements reached at conferences and ratified by fora such as the General Assembly of the United Nations.

In Rio we made considerable progress. Yes, we did not do everything that we had hoped for. But we did make very significant progress. And the United States and others really signed on to some very important agreements: the agreement on climate change, the Convention on Climate Change, the Framework Convention; the Convention on Biodiversity, both of which has now been ratified by the United States; the Convention to Combat Desertification, which you, Senator Jeffords, have taken such an important leadership role in. And so we very much hope now that there will be a renewal in that leadership.

I was pleased to hear Administration officials here, who I know, presenting the case for continued strong support for so many of these issues, but frankly not all of the ones where U.S. leadership is important.

I see my time has lapsed, so I would be delighted to expand on any of these concerns in the question period. And again thank you, Senator Jeffords.

Senator JEFFORDS. Thank you very much.

Next is Professor John Dernbach. He is a Professor of law at Widener University Law School. He is editing a book, "Stumbling Through Sustainability," that assesses progress that the U.S. has made on sustainable development in the past 10 years and recommends next steps. Welcome, Professor.

STATEMENT OF JOHN C. DERNBACH, PROFESSOR, WIDENER UNIVERSITY LAW SCHOOL

Mr. DERNBACH. Thank you, Chairman Jeffords, Senator Feingold. It is a delight to be here. I appreciate the opportunity to discuss U.S. adherence to its sustainable development commitments, particularly those made at the Earth Summit in 1992. As you mentioned, I am the editor of a 32-chapter book on U.S. sustainable development efforts in this past 10 years. The book is being published this week by the Environmental Law Institute here in Washington. The book's 42 contributors come from universities and law schools, nongovernmental organizations, the private sector, and State Government. They are respected experts in their fields.

What I would like to do is briefly review some of the book's findings and then share some of its basic recommendations in a little greater detail.

The U.S. has, unquestionably, begun to take some steps toward sustainable development, largely because of our environmental and conservation laws. Yet, on balance, the United States is now far from being a sustainable society, and in many ways is farther away than it was at the time of the Earth Summit in 1992.

International leadership begins at home. With 5 percent of the world's population, the United States was in 1992 responsible for about 24 percent of the world's energy consumption and almost 30 percent of the world's raw materials consumption. Since the Earth Summit, materials use has increased 10 percent, primary energy consumption has increased 21 percent, and energy-related carbon dioxide emissions have increased by 13 percent. Over and over, the books contributors found increases in materials and energy efficiency, and in the effectiveness of pollution controls for individual sources, were outweighed by increases in consumption and in-

creases in pollution related to the manner in which things were made. Despite a significant increase in municipal waste recycling in the past decade, for example, U.S. generation and disposal of municipal solid waste per capita have been growing since 1996.

According to Harvard biologist Edward O. Wilson, "four more planet Earths" would be needed for "every person in the world to reach present U.S. levels of consumption with existing technology." Yet the U.S. standard of living, equated with high levels of consumption and the "good life," is widely envied and emulated throughout the world.

In this and in many other ways, though not all ways, the United States has not exercised the kind of leadership necessary for sustainable development. My sense is that we are often unwilling to face such issues because we do not feel like we have the tools. The book provides an issue-by-issue roadmap for sustainable development in the United States and ways that would enhance prosperity and protect and restore our environment.

For starters, the Federal Government should adopt and implement a national strategy for sustainable development, with specific goals and priorities, to harness all sectors of society to achieve our economic, social, environmental, and security goals. The strategy would lead to a stronger, more prosperous America with higher quality of life because we would be pursuing these goals in ways that support each other in greater and greater degrees over time, rather than undermine each other. The strategy could be modeled on that of the European Union or States such as Oregon and New Jersey, and specifically address climate change, biodiversity, international trade, and other major issues. The President could get the process started with an appropriate Executive Order to Federal agencies under the Government Performance and Results Act and the National Environmental Policy Act. An executive-level entity would be needed to coordinate and assist in the implementation of the strategy. A counterpart entity in Congress would also be helpful. A set of indicators to measure progress in achieving goals would make the strategy more effective and meaningful.

In addition, the United States needs to recognize that its substantial consumption levels, coupled with domestic population growth, have serious environmental, social, and economic impacts. Americans also need to understand that human well-being can be maintained and enhanced by more efficient and effective use of materials and energy and by less polluting means of production. There are a variety of legal and policy tools available to deal with this, including a number of policy and legal tools that have been applied at the State level, including renewable energy portfolio standards, Senator, as you know, and smart growth legislation. Northern European countries are also experimenting with a shift in taxes on materials and energy, on one hand, they are shifting some of the tax to there from labor and income, on the other hand. And there is some very interesting research on that.

The U.S. needs to take a stronger and more constructive role internationally, not only on terrorism but on the broad range of issues related to sustainable development. Congress should repeal or modify laws, policies, and subsidies that encourage unsustainable development. Protection of natural resources and the

environment must focus more holistically on the resources to be protected, and on understanding those resources. Finally, transportation, public health, and other social infrastructure and institutions should be designed and operated to further economic, environmental, and security goals at the same time.

We know what we need to do, and we also know why. The challenge I think is to deliver on what we know. Thank you.

Senator JEFFORDS. Thank you very much.

Our next witness is Christopher Horner. He serves as Senior Fellow at the Competitive Enterprise Institute, and is counsel to the Cooler Heads Coalition. We need you. Welcome.

STATEMENT OF CHRISTOPHER C. HORNER, SENIOR FELLOW, COMPETITIVE ENTERPRISE INSTITUTE

Mr. HORNER. Thank you, Mr. Chairman, Senator Feingold, for your interest. I appreciate the opportunity to testify before this joint panel on what is a very important topic. The scope of the hearing is broad, as evidenced by the Administration's testimony regarding all of its efforts and all of the treaties we have committed to. So I am going to limit my testimony to the propriety or impropriety of the U.S. implementing or, more accurately, amending the Rio Treaty, the U.N. Framework Convention on Climate Change, by adopting or ratifying the Kyoto Protocol.

For whatever specific reasons, be they economic growth, failure to foresee the energy requirements of the new economy, or other, the U.S., like many nations, failed to meet its Rio targets, the specific numerical target of 1990 greenhouse gas emission levels, although not our funding targets and other efforts we did implement successfully. Now some advocates assert, because the U.S. has not met its Rio goal, we must commit to even greater, that is, more unrealistic, mandatory reductions, that is, Kyoto. Attempting instead to comply with the initial treaty seems the more appropriate response, for several reasons.

Rio went into force in March 1994. President Clinton did not request, nor did Congress enact, independent legislation implementing Rio, which was not an inherently self-implementing treaty. Authority and precedent make clear that responsibility for proposing such programs lies with the White House. If our non-binding Rio obligations in fact bound the U.S. to achieve specific reductions, contrary to contemporary Senate and Executive assertions of U.S. intentions, then the Executive interpretation of Rio Article 4 specifically throughout the 1990's was actually incorrect, and is responsible. The pending question is apparently, does the U.S. respond by attempting to meet such Rio promises, or by making further, even deeper, binding promises?

Skipping specific pursuit of the U.S.' Rio promises, in favor of Kyoto's binding commitments even greater than those we have failed to attain, seems highly illogical. Compounding this of course is that precisely 5 years ago tomorrow, happy anniversary, the Senate unanimously spoke to what it recognized was an unacceptable drift away from the U.S.' Rio stance adamantly opposed to binding commitments. The Senate, seeing what was developing, asserted its "advice" pursuant to Article II, Section 2 of the Constitution, passing Byrd-Hagel S. Res. 98 unanimously.

Subsequent to and despite this advice, U.S. negotiators clearly disregarded both major Byrd-Hagel recommendations: Kyoto did not require developing countries to share our commitments, and even the Clinton White House economic advisors have recanted their refutations of the Kyoto cost estimates.

Since then, nothing has emerged to indicate that Kyoto does not still violate both key Byrd-Hagel conditions, and it is likely that very few Senators, though new members have arrived, have amended their position against a treating causing "serious economic harm." However, Clinton Administration officials did admit that they began working on the plan for binding commitments within 1 year after Rio went into effect.

Kyoto, too, is clearly intended to be a similar step in a "treaty hopping" campaign; even the models on which it is based predict an undetectable climatic impact, at a cost to the U.S. of up to $400 billion annually, according to EIA, yet maybe 1/30th of what its proponents seek. Rio and Kyoto offer differing commitments but purport "the same ultimate objective." The U.N. IPCC has said that this means reducing greenhouse gas emissions by as much as 60 to 80 percent, which of course wildly exceeds Kyoto's specified ambitions.

As such, the U.S. should require, prior to and as part of ratifying any further agreements, express acknowledgement not only of the actual "ultimate goal," but that it is committed to its practical requirements, in this case up to "30 Kyotos." In this case, to a degree, I agree with Professor Dernbach, which is we need to set out specifically where we are going and what this requires. Now, I do not agree entirely with the Professor's testimony, but in concept, if this is where we are going, we need to expressly set it out in advance, now given that knowledge has changed, the interpretation of the ultimate goal has changed.

Such treaty hopping agendas illustrate the importance of Senate treaty "reservations," or the Senate's second bite at the "advice" apple. This comes of course during the "consent" function, which function the U.S. negotiators unfortunately eviscerated. After agreeing to terms incompatible with Byrd-Hagel, the Administration also accepted Kyoto's prohibition on reservations, or the Senate's ability to specify the specific understandings or conditions of the U.S. commitment. This despite the Senate having also forewarned the Administration about this in advance of Kyoto.

In summation, President Bush ought to match his assertions of having "reject" Kyoto with the requisite submission to the U.N. to that effect, as was done regarding the International Criminal Court. In the absence of that, the White House must at minimum assist resolution of the ambiguous U.S. role in Kyoto—we sent that letter to the U.N. for a reason. Signatures carry responsibilities—by requesting the Senate disapprove of the treaty. In the absence of that, the Senate should recognize that there is no reverse equivalent of the "presentment clause" regarding treaties. Only protocol, not any constitutional prohibition, impedes Senate consideration of a signed treaty. Certainly given the imperative rhetoric surrounding Kyoto, if President Bush insists on continuing the U.S.' ambiguous role, the Senate should take matters into its own hands and decide the fate of the treaty.

That resolution should by definition, for the process problems I identified, be rejection of Kyoto. Otherwise, by accepting this double indignity of ignoring advice and prohibiting reservations, this body would condone Executive circumvention of the Senate's constitutional treaty role. Thank you.

Senator JEFFORDS. Thank you for that advice. I appreciate it.

Senator FEINGOLD.

OPENING STATEMENT OF HON. RUSSELL D. FEINGOLD, U.S. SENATOR FROM THE STATE OF WISCONSIN

Senator FEINGOLD. Thank you very much, Mr. Chairman. I am pleased to be here today. I think the idea of having the Foreign Relations and Environment and Public Works Committees come together to conduct oversight of the implementation of U.S. commitments under the environmental treaties that the Senate has ratified is both a good idea and it is long over-due. So I think you, as I frequently feel toward this Chairman.

The United States was among the principal architects of each of the agreements we are examining today. U.S. negotiators worked hard to develop and craft these agreements and ensure our Government and our interests were well-represented. The Senate then ratified these agreements with the view that desertification, ozone depletion, global climate change, trade in endangered species, and sustainable development through trade were important national and global issues. I am concerned, given our history and leadership, about the growing perception internationally that the United States is backing away from our international environmental commitments. I am pleased that the Administration testified on this. I am eager to hear more because I suspect that much of the ongoing diplomatic effort on these agreements may be under-reported in the press.

Nonetheless, I believe that there is a serious perception problem, and one that needs remedied. It is my view that unless the United States exercises leadership for sustainable development in all relevant international forums, it will continue to miss many opportunities to improve environmental and social conditions worldwide, and it will perpetuate a perception that the United States does not keep its sustainable development commitments.

As the Ranking Member of the Subcommittee on Africa of the Foreign Relations Committee—excuse me, as the Chairman of the subcommittee, thanks to Senator Jeffords——

[Laughter.]

Senator FEINGOLD. I used to be the Ranking Member. That is why I said I thank him a lot. But I have had the opportunity to see first-hand how valuable the provisions of these agreements are to the people of Africa, where nearly one-quarter of dry lands are moderately or severely desertified, ozone level changes only exacerbate that problem, and endangered species contribute significantly both culturally and economically to many African states.

These issues cut across borders and affect entire regions. One of the primary benefits, in my view, of U.S. participation in these agreements is the opportunity to take advantage of multilateral coordination to address these problems.

So I thank you, Mr. Chairman. And if you would permit, I have just a couple of questions.

Senator JEFFORDS. Please proceed.

Senator FEINGOLD. Let me first say that I was pleased to come here because of the importance of the hearing. But I am particularly thrilled because Professor Dernbach is a friend of mine who I have not seen in about thirty years. We debated against each other in high school. He is one of the smartest guys I have ever met. I think we each won some, is that fair to say, John?

Mr. DERNBACH. Something like that, yes.

Senator FEINGOLD. I have admired his work on environmental issues from afar. He is a wonderful choice to have before the Committee, and a native of our great State of Wisconsin.

Let me ask a question first of Mr. Strong. You mentioned in your statement a concern that I share, as I have just indicated, that the perception that the United States' efforts on environmental issues is dwindling and that it is affecting our bilateral relationship. Would you share for the record the effects you have observed with our closest neighbor, Canada.

Mr. STRONG. Yes. Thanks, Senator. I do not of course speak for Canada, but I have less reticence to express my concerns about the Canadian position that I do here in this Senate about the U.S. position. I have to say that your sum of the retreat, what I have called retreat from leadership, and of course it is not an across-the-board retreat on every issue, has spilled over to Canada.

We have a very serious national controversy now about whether Canada should or should not ratify the Kyoto Protocol. That is probably the most significant single impact. Of course the decision of the United States has immense influence, and there are immense constituencies in the industry in which I used to be, the energy industry, there is quite strong resistance, though not across-the-board resistance. Our Prime Minister has committed his government to ratify, but the provinces in Canada have significant rights and some of them, particularly Alberta and even Ontario, where I live, have come out against that. So they have not made their decision. But there is no question that on this issue and so many others, what the U.S. does influences Canada.

And to just add to that, there is significant public concern about the current U.S. position on some of these issues. The polls in Canada show, as I believe they do here in the United States, a higher degree of public concern than is expressed yet at the top political levels.

So, yes, what the U.S. says and does matters in Canada. But it also I have to say, as one who spends a lot of my time outside of this continent, it matters everywhere.

Senator FEINGOLD. Professor Dernbach, I think you would agree that U.S. concern over cost of compliance contributes significantly to the current difficulties with the Kyoto Protocol. I believe you looked at this issue in some detail. Would you share with the committee some of the economically beneficial actions we have taken to implement our commitments under the Framework Convention on Climate Change, and just highlight briefly some opportunities for further meeting our current commitments at low-cost, even if the U.S. Government does not actually ratify Kyoto.

Mr. DERNBACH. A lot of the positive things that have been done on climate change in the last 10 years have occurred at the State level. There is actually a fairly large number of legal and policy tools that have been employed at the State level—tax credits metering, which would allow somebody with a big windmill to sell their excess electricity back to the grid; renewable energy portfolio standards that require electricity providers to scale-up the amount of renewable energy that they provide on a fairly steady basis. There are many, many of those kinds of tools out there that are being used.

What is particularly interesting about State use of those tools is the justifications the States use, justifications that you do not hear in the national climate debate. Let me share what I mean by that.

At the State level, there is a lot of conversation about creating jobs, developing technology, protecting poor people from the adverse effects of fossil fuel price fluctuations, reducing other pollutants, and strengthening the economic base of the State. Climate change is almost incidental in a lot of those discussions, even though reducing greenhouse gases is surely one of the results.

I think that what that suggests is that if we look hard at the various types of things that States have been doing, looking at the effects of those, you could fashion I think a fairly potent, fairly effective, fairly economically beneficial package of legislation to deal with climate change at the Federal level that would create jobs, develop technology, enhance our export markets, would attract capital investment, would drive down costs of renewable energy and make electricity a lot more affordable for other folks, among many, many other things.

So, in sum, the experience of the States on climate change suggests a very different way of thinking about both the benefits and the costs of climate change than a lot of the conversation that I hear at the national level.

Senator FEINGOLD. Thank you, Professor Dernbach. It is good to see you again. And thank you very much, Mr. Chairman, for your generous amount of time.

Senator JEFFORDS. Thank you for coming. We appreciate your presence here. It is important.

Let me now turn to some questions. Mr. Strong, what do you see as the major differences between preparations for Rio and Johannesburg, and what has impeded the current process?

Mr. STRONG. Mr. Chairman, part of the difference of course is the change of political climate. The preoccupation of the United States and other countries with the war against terrorism, the economic implications of the downturn, I think this has all created a more difficult climate. Also, I think there has been perhaps a less extensive involvement of the various constituencies, the civil society constituencies, et. cetera. And most of all, I would say the cloud cast over the Summit by the recent actions of the United States that have been reported here both internationally and domestically which signal a significant backing away, should I say, of the kind of leadership that the world community has looked to the United States for for so much of the thirty years since Stockholm put the issue on the agenda.

There is a response to that. For the first time, as you know, Senator, some of the traditional friends of the United States which have always followed its leadership in the past, even when they were a little uncomfortable about it, are not necessarily now following its leadership on these issues. As you know, the European Union and Japan, despite controversies, have ratified the Kyoto Protocol. We still have not got enough to make that 55 percent. I hope my own country will weigh in on that. The position of Russia is still not certain. But this has cast a cloud.

Now it is true that the United States, as the Administration officials have said, are doing some very good work in some very good areas. But on the more fundamental issues that literally affect the future of our civilization and of our economies, there is a huge concern that Johannesburg will actually see some slippage from the performance under the commitments reached at Rio and before.

So I see Johannesburg as a very, very important milestone, not, Senator, because conferences solve everything, but because they provide the gathering point where you can either breakdown in your attempt to move forward or you can actually move forward. At the moment, the signs are very, very disconcerting. I believe that if we lose the opportunity of Johannesburg to move ahead on these issues that literally we will face threats to our security and our economy over time even greater than those that we face from the horrendous terrorist acts.

May I mention one other thing, sir. In my statement, I would like just to call your attention to a couple of specific suggestions that I will not elaborate here. But my conviction is that the reason for slippage fundamentally in our commitments is motivation. That is why I am spending so much of my time on the motivational issues. What are they? One is the economic motivation, the whole system of fiscal measures, taxes, policies, regulations by which governments incent the behavior of corporations and industries. And in all countries, including this, they are heavily skewed to continue to incent unsustainable behavior. I believe it is quite possible for those measures to meet their primary objectives without having the same consequences. And I think if this body could even initiate a review of that whole system, in a sense do an environmental performance review on fiscal tax subsidy policies, et. cetera.

The second motivational aspect is moral and ethical. That becomes very, very important and it is deeply important for America which is based on values. A distinguished American, David Rockefeller, headed the group that has drafted the Earth Charter, a statement of basic moral and ethical principles designed to guide the conduct of nations and peoples toward the earth and toward each other. That we hope the U.S. will support. It does not have to agree to it in a formal manner, but we hope that the United States delegation will recognize it. Your Conference of Mayors and many U.S. organizations representing literally several millions of Americans have endorsed this. We would like to see, sir, America recognize this because, again, our moral and ethical values are at the root of the way in which we set our priorities and the way in which we respond to this challenge.

This country's history and its example has been based on its commitment to moral and ethical values. Therefore, I am hopeful

and encouraged that you are going to rise to that. And this hearing certainly underscores and reinforces that, sir. I am sorry I took a little long to respond to your question, but I do feel strongly, as I know you do, about these issues.

Senator JEFFORDS. Very excellent statement. I am taking it under careful advisement. Thank you.

Mr. Horner?

Mr. HORNER. I would like to distinguish Rio and Johannesburg and possibly break new ground for me and praise the Administration for what they are doing in preparation for Johannesburg. First, with Rio we had a cue of treaties that had been developed over years that were to be culminated in Rio. We do not really face that now. We face, as the Administration witnesses testified, talking more about details, actual implementation, the state of implementation, next steps. And I do applaud what the Administration is trying to do regarding good governance, saying in essence capacity-building, which is a term used in the environmental treaty context quite a bit, we will pay countries to be ready to receive what they will receive under the treaties. We are trying to build capacity for good governance through economic and judicial reforms, openness, to say are you ready to take this environmental and general foreign aid and not have it go down the rat hole, for which I applaud them.

Now they did get off track with handling environmental issues very poorly, including again recently, May-June, and with that submission their efforts at focusing on known problems that purportedly would be worse under, for example, climate change. They redirected the focus back to climate change, but they were doing very well in advancing it toward safe drinking water, the world's number one environmental threat, which purportedly would be worse. But for a cost of a year of Kyoto you could make significant advances in that. AIDS, infectious diseases, they need to get the dialog back where it was.

They have made progress. The focus on good governance, capacity-building for receiving this aid so we can have actual environmental improvement for environmental aid, it is the right direction. I just hope they stay focused.

Senator JEFFORDS. Thank you.

Mr. Dernbach, what is your prognosis for the World Summit? And what follow-up activities are needed?

Mr. DERNBACH. My hope for the World Summit is that we come out of it with specific targets and timetables, not just for the social issues, as important as the social issues are, but also for environmental issues. And what I mean by targets and timetables are the kinds of things that have been suggested by a great many organizations including the OECD, which is to say by a certain date we achieve a certain result, either internationally or regionally or nationally. Without targets and timetables, you have goals with no deadline that are in some basic way as a result not goals at all. So that is what I would hope would come out of the World Summit.

But beyond that, and I think this is the important message from the book, is that what we do for sustainable development is not just what we agree to or do not agree to in Johannesburg, it is what we do at home. That is why the book is overwhelmingly di-

rected at the United States and actions that decisionmakers in the United States ought to be making at the national level, State level, the local level, corporation decisionmakers, deans in colleges and universities, businesses and others. And that is what I hope will really come out of Johannesburg, that it will provide a kind of lift, if you will, to the Rio process, engage people on the importance of reconciling our environmental goals with our social, economic, and security goals.

Senator JEFFORDS. Mr. Horner?

Mr. HORNER. I just want to get back to leadership I guess, in following on Professor Dernbach's comments. We need to recognize that for all intents and purposes the Bush position, despite bad-mouthing Kyoto, is indistinguishable from the Clinton-Gore position on Kyoto. For twenty-five months after signing the treaty for which it was open for ratification, they never sent it to the Senate. My thesis in my testimony is that is not necessary. But they did not do it. President Bush will not send it apparently. Neither would withdraw from it. One bad-mouths it, one talks a good game about killing it, though not really doing it. One talked a good game about pursuing it, though not really doing it. The position is indistinguishable.

Leadership, of course, does not mean abandoning your own perspective, and the U.S. certainly has its own perspective on this, in large part it is because it would be the most greatly impacted by the treaty. So I think the Administration and the U.S. as a whole deserves to maintain its own perspective without others claiming that it has abandoned leadership by not doing what everybody else has done.

Senator JEFFORDS. Mr. Strong, comments?

Mr. STRONG. I would like also, Mr. Chairman, to see some other initiatives. Energy was one of the issues that our friends from the Administration highlighted. It is at the heart of so many issues. I come from the energy industry myself and so I feel very deeply about that. One of the particular initiatives that I believe the United States could put on the table that would totally in line with I believe the general approach of this Administration is to call for the creation of a consultant group on clean energy, modeled very much on the consultant group on international agriculture research which did so much in the last quarter century so to relieve the prospect of an eminent food shortage in the world. And it is not even an incorporated entity. It is a mechanism that brings private and public interests together around the table to determine priorities for research and development, particularly in the developing world, and how to mobilize the funds to permit the developing countries, in particular, to afford the best available technologies. And it is not a new organization, but it is a very effective mechanism. I believe it would be entirely feasible for the United States to champion the establishment of such a thing.

I think you mentioned, Mr. Chairman, about the importance of the global environment facility, of closing that gap that must be closed, that must be closed almost immediately to permit the replenishment to take place. That would also give prospects and morale for Johannesburg a boost.

And then, finally, one initiative that I believe could emanate from this Senate, and that is we understand that you are to receive a report from the General Accounting Office soon setting out the U.S., and I am not sure if it covers others, performance under existing agreements. This could provide I suggest, Mr. Chairman, the basis for establishment of a regular monitoring process with reports coming out each year or 2 years, very much like the State Department reports on human rights and one or two other things, which would highlight the performance of the United States and others in respect of the commitments that they have already put in place. It would be a fairly easy thing to do based on the report of the General Accounting Office, which I think is on its way. It is just one modest suggestion, sir, of how in a practical way there are still a lot of things that you could do working toward those larger issues.

Most of all, sir, I am concerned that it really give people a new sense that their leaders really are responding to this challenge, that there is real movement, that there is a new spirit of international cooperation, and international faith in the United States as the leader of that cooperation.

Senator JEFFORDS. Any final comments?

Mr. HORNER. I would like to say in the spirit of that, although the State Department offers me a tortured definition of the term "Parties to Kyoto," the United States can let other ratifying Parties have what they claim to want. If the U.S. withdraws, we have 55 percent because 55 percent of X is now 55 percent of a much smaller number. It takes a very difficult interpretation of the Kyoto Protocol to read otherwise. If that is what they want, if some people truly believe that will help save the Planet, while we have not arrived at that position, we ought to withdraw and let them have what they want. If the other sides offer the interpretation of, well, we cannot have this go into effect against us yet, that would be interesting, but it would also likely bring negotiations back to a sane plane.

I hope we all remember when these negotiations fell apart. They were in the Hague in 2000. The U.S. elections had occurred but had not been decided. Pause, wait for comment. Some members of the Foreign Relations Committee were there. I saw Senator Kerry. The EU refused to take yes for an answer because they saw desperation in our eyes. They changed the definition of "sinks" from "sinks shall be used" to "but not really," and then "but not really if you are the U.S. but certainly if you are Russia," giving them millions of more dollars but making it very difficult for us to at least initially even comply. They fell apart in November 2000 and they have not recovered since.

I believe if this is something the Administration really wants to negotiate, that is, a Byrd-Hagel compliant binding agreement, the place to start is by withdrawing from Kyoto, have the other Parties decide if they want it to go into effect against themselves, or interpret it otherwise and say we are going to now start renegotiating with you but this time in a little better faith. Because what happened in the Hague really defies a good faith explanation.

Senator JEFFORDS. Mr. Dernbach?

Mr. DERNBACH. I want to thank you, Mr. Chairman, for holding this hearing. I think this is an incredibly important issue. There is a lot more at stake here than the environmental, and there is a lot more at stake here than any specific environmental issue.

If we have learned anything in the last couple of decades, it is that the environment is connected to everything else that we care about—peace and security, economic development, national governance, and social well-being. We now face an enormous problem of environmental degradation around the world and a growing gap between the rich and the poor. The problems are quite real and they are not going to go away. Put a little different way, poverty and environmental degradation are deeply destabilizing because they stifle or reduce opportunities and quality of life for many, many people.

The next fifty years global population is projected to increase by 3 billion. The global economy is likely to grow by four or five times. As difficult as things now are, as challenging as the domestic and international situation now is, environmental degradation and the gap between the rich and the poor are likely to get worse and greater if we continue with business as usual. The question that I would leave is whether that should be our legacy for our children and our grandchildren.

There are things that we can do. We know we can do them. We ought to know that we need to do them. And I want to congratulate you again for holding a hearing to focus on these questions. Thank you so much.

Senator JEFFORDS. Thank all of you for your really excellent presentations. I was listening very strongly and I just feel concerned, as you do, that we must change our ways if we are going to be the leader that this Nation should and must be as we move into the future.

And I want to especially thank all of those that are attending here who have been very, very entertaining in the sense of looking very interested, and I believe you all are. If I asked a show of hands, how many agree with the last presentations that were made here?

[No response.]

Senator JEFFORDS. Nobody?

[Laughter.]

Senator JEFFORDS. I just wanted to check on you.

Thank you everyone. It has been a very interesting and enlightening morning. We were pleased to have you all here.

The hearing is adjourned.

[Whereupon, at 12:35 p.m., the committees were adjourned, to reconvene at the call of their respective Chairs.]

[Additional material submitted for the record follows:]

STATEMENT OF HON. JAMES M. JEFFORDS, U.S. SENATOR FROM THE STATE OF VERMONT

I'm glad to be here with my distinguished co-chair from the Foreign Relations Committee for this joint hearing. I appreciate his willingness to explore today's topic, and the fact that he has joined me as a sponsor of S. 556, the Clean Power Act. I would also like to applaud him for his work to bring some truth and sanity to America's accounting nightmare.

The United States is an economic and military superpower, perhaps the lone superpower. But, as the old adage goes, with great power comes great responsibility.

We are able to project great might far beyond our borders. We are also capable of contributing to environmental and natural resource damage far beyond our borders and far in excess of other countries. The question is, are we acting responsibly to curb negative impacts abroad and at home?

Are we being good global neighbors and, at a minimum, keeping our word? It seems that we may be keeping our literal word, given the very broad language in many of the agreements. But in practical terms, it seems that we're not trying very hard to keep up with the spirit of some of our commitments.

The time is ripe for Congress to review how the Administration is implementing our environmental agreements and commitments. Leaders of many countries will be meeting in Johannesburg, South Africa, in late August at the World Summit on Sustainable Development. The occasion is the 10th anniversary of the United Nations Conference on Environment and Development held in Rio.

I'm pleased to note that the Secretary General of that Conference, Mr. Maurice Strong, is here today to give us some historical perspective on that event and its lasting effect.

The conferees will be met by a very different U.S. delegation in South Africa. The previous Bush Administration provided extensive support for the Rio Earth Summit and brought many new initiatives to the negotiating table.

But this Administration is likely to send a smaller and lower-level delegation and has sought to narrow the scope of the discussions. This has apparently included an effort to keep global climate change off of the agenda.

I am troubled by the Administration's approach to global warming, especially in light of the Sense of Congress approved by the Foreign Relations Committee and made part of the Senate approved energy bill in April. That Resolution says the United States should take responsible action to ensure significant and meaningful reductions in emissions of greenhouse gases from all sectors.

But it doesn't appear that responsible action is taking place and emissions continue growing. As my friend Senator Chafee pointed out during our Committee's markup of the Clean Power Act, the Administration's Climate Action Report says, "A few ecosystems, such as alpine meadows in the Rocky Mountains and some barrier islands, are likely to disappear entirely in some areas. Other ecosystems . . . are likely to experience major species shifts . . ."

Our treaty commitment says, "The ultimate objective of the Framework Convention on Climate Change is to stabilize greenhouse gas concentrations in the atmosphere at a level that will prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change. . . ."

Since these ecosystems are likely to disappear entirely because of manmade global warming and will not be able to adapt naturally, it appears that we have entered the zone of "dangerous interference." Since these are real threats of serious or irreversible damage, the lack of full scientific certainty about cause and effect shouldn't be used as an excuse for not reducing emissions now. That is also our commitment.

Instead of acting to reduce emissions, the Administration's approach guarantees that greenhouse gas emissions will rise. According to Mr. Connaughton's recent testimony, there is". . . no question about that."

This kind of inaction doesn't comport with our commitments under the Framework Convention, the Sense of Congress, common sense or the National Environmental Policy Act (or NEPA). In 1969, NEPA became law. It was probably the first adoption of a sustainable development philosophy by a government in the world. To paraphrase, it says:". . . it is the continuing policy of the Federal Government . . . to use all practicable means and measures . . . to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans."

Unfortunately, the Administration seems to have lost sight of those future generations of Americans. Economic development that does not factor in the environment or quality of life of those future generations is not sustainable.

The Administration and other opponents of the Kyoto Protocol claim that actions to significantly reduce greenhouse gas emissions cost too much now. They need to look at the long term. They also need to look at the many studies that have been done that show a net positive impact of reducing emissions.

I ask unanimous consent that two such studies by the Tellus Institute and a list of other studies be placed in the record.

There is no question that we must be concerned with the threats of today, like the thousands of people dying prematurely every year from power plant pollution. But, we can't let the press of quarterly reports or the hunt for short term profits prevent us from acting to reduce the threats of tomorrow. That's especially true in

the case of terrorism or global warming, where we have been presented with credible information about the threat.

As some of my colleagues know, I have a special interest in the U.N. Convention to Combat Desertification and pressed hard for its ratification. Senator Helms was instrumental in moving that treaty and I want to thank him for his and his staff's efforts in helping me and others get that agreement approved. This treaty addresses land degradation in some of the very impoverished parts of the world. It is designed to encourage participatory democracy and stakeholder involvement. I look forward to seeing how implementation is going.

I also have an interest in ratifying and implementing the Convention on Persistent Organic Pollutants. I have introduced legislation maintaining the spirit of that treaty. I hope we'll be able to get that moving soon so the U.S. can participate in the Conference of Parties and the Review Committee.

There seems to be generally good news regarding chemicals that harm the ozone layer. From all indications, the Montreal Protocol has been a success, though I gather there are some additional amendments coming soon. I'll be interested to learn how our efforts have reduced the ozone hole.

There is less clear news on the status of the Convention on Biological Diversity, which was signed in 1993 but has not been sent to the Senate for ratification. I would also appreciate hearing an update from our witnesses on the progress toward implementation of the Basel Convention regarding the international transportation of hazardous waste.

Finally, I would note something that is a little different between international agreements and our more conventional environmental laws. They often seem to be missing performance criteria or include very weak commitments.

Unfortunately, in the case of climate change, even when commitments are minimal, such as reporting on the policies and measures we have adopted to achieve 1990 levels, we have failed.

So, I would urge our negotiators to push for more specific environmental goals, using targets and timetables. That will make it easier for the Senate to know whether the treaties we have ratified are succeeding. Also, I believe the result will be better for the environment and sustainable development.

Thank you.

STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Thank you, Mr. Chairman, for calling this hearing today on an essential topic—our nation's implementation of our international commitments on the environment. I regret that I am unable to attend today, but I must preside over the markup of the homeland security bill in the Governmental Affairs Committee.

Ten years ago, the world took a dramatic step toward a sustainable future when it convened the Earth Summit in Rio De Janeiro during the tenure of the first President Bush. The Summit resulted in several of our most critical environmental agreements, including the Conventions on Climate Change and Biodiversity.

Unfortunately, as we prepare for the next "Earth Summit" a decade later, this Bush Administration does not appear to have taken as aggressive an approach to our global commitment to environmental protection as its predecessor did. In fact, we appear to be going to the summit in Johannesburg with little more than a plan to delay enforceable action on the planet's critical needs.

The most visible—and most integral—of the Rio agreements for our sustainable future may be the U.N. Framework Convention on Climate Change. As is well-known by now, however, this Administration has abdicated our nation's leadership on the issue, withdrawing from the Kyoto Protocol and offering no alternative path forward. That's disturbing enough. But now we also appear ready to distract the world's attention from addressing this problem.

As I understand it, the United States has affirmatively stated to the world community that President Bush will not attend the conference in Johannesburg next month if the climate change treaty is discussed. It is one thing to ignore this pressing problem domestically, as President Bush's business-as-usual proposal is essentially doing. But it is entirely another to ask the rest of the world to put it aside as well.

Luckily, in lieu of executive leadership, we have other branches and levels of government that can act, and are acting. The Environment Committee recently passed the Clean Power Act, legislation limiting the release of greenhouse gases from power plants. Governor Gray Davis of California just this week signed legislation limiting greenhouse gas emissions from motor vehicles. And many other proposals are in the

works. The world understands we need to move ahead on this issue, the States understand we need to move ahead on this issue, and American citizens understand we need to move ahead on this issue. It is time for the President to understand.

I therefore call on him to attend the Johannesburg summit and take the climate change issue on, head on. Perhaps, when he does, he will see the light.

STATEMENT OF JOHN F. TURNER, ASSISTANT SECRETARY OF STATE FOR OCEANS AND INTERNATIONAL ENVIRONMENTAL AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Introduction

Chairmen Jeffords and Sarbanes, and other members of the Environment and Public Works Committee and the Foreign Relations Committee, I appreciate the opportunity to appear before you today to review U.S. implementation of environmental treaties. The United States has a strong record on global environmental issues. We are a leader in addressing environmental challenges on the international level, having spearheaded efforts to negotiate environmental agreements on issues ranging from ozone depletion to stemming illegal trade in endangered species. Just a few weeks ago, the President submitted to the Senate an important treaty between the United States and Russia that would strengthen the conservation of our shared polar bear population through a coordinated sustainable harvest management program.

In the case of toxic chemicals, the Administration submitted to Congress this spring, the Stockholm Convention on Persistent Organic Pollutants (POPs) and additional legislation that would allow the United States to implement this agreement, in addition to a regional agreement POPs agreement and a treaty on Prior Informed Consent. These multilateral agreements affirm the U.S. commitment to cooperate with other countries on global health and environmental challenges. My distinguished colleague, Jim Connaughton, just discussed the enormous challenges we face addressing climate change and how the Bush Administration intends to tackle the problem while ensuring our economy continues to grow.

These treaties are just a few examples of environmental agreements that serve as noteworthy tools in our foreign policy arsenal. The Department of State plays an important role in monitoring the implementation of these agreements and working inter-agency and international processes to ensure U.S. interests are served. For illustrative purposes, we would like to describe our efforts related to the following five agreements we have ratified and currently are implementing—the Montreal Protocol on Substances that Deplete the Ozone Layer; the Convention on International Trade in Endangered Species (CITES); the U.N. Framework Convention on Climate Change; the North American Agreement on Environmental Cooperation; and the U.N. Convention to Combat Desertification.

The Montreal Protocol on Substances that Deplete the Ozone Layer

During the 1980's, the United States led a global effort to negotiate an agreement to phaseout the production and consumption of substances that deplete the ozone layer. Scientific evidence showed that strong steps were needed to protect human health from the debilitating effects of ozone depletion, such as increased incidence of skin cancer and cataracts. These global efforts resulted in the adoption of the Montreal Protocol on Substances that Deplete the Ozone Layer in September 1987, which was ratified by the United States in 1988, and has now been ratified by 182 other countries.

Over the last 15 years, implementation of the Montreal Protocol and its subsequent amendments has yielded remarkable progress in protecting the stratospheric ozone layer by phasing out the consumption and use of ozone depleting substances on a global scale. The United States has met its obligations under the Montreal Protocol by phasing out chlorofluorocarbons (CFCs), halons, carbon tetrachloride, and methyl chloroform.

Although the State Department is the lead agency responsible for coordinating our participation in the Protocol, the Environmental Protection Agency (EPA) is the principal entity responsible for domestic implementation of the Protocol, under authority provided by the Clean Air Act. (The Clean Air Act specifically authorizes EPA to take steps necessary to ensure that our domestic regulations are consistent with our obligations under the Protocol.) Additionally, the Department of Justice and EPA have played an important role by identifying and prosecuting individuals engaged in illegal smuggling of ozone-depleting substances, making the United States a world leader in these law enforcement activities.

The Protocol also includes provisions to establish a Multilateral Fund to provide financial and technical assistance to developing country Parties to assist them in meeting their obligations under the Protocol. As the largest contributor to the Multilateral Fund, the United States has made available over $340 million to the Fund since its inception.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES, called by some the Washington Convention, concluded on March 3, 1973 in Washington, DC. and entered into force on July 1, 1975. As of July 1st of this year, 158 Parties have adopted the Convention.

CITES conservation goals are to: monitor international trade in endangered species; maintain those species in an ecological balance; and assist countries toward a sustainable use of species through international trade. The contracting Parties to CITES recognize that international cooperation is essential for the protection of wild flora and fauna.

CITES Parties regulate wildlife trade through controls and regulations on species listed in three appendices. Appendix I lists species threatened by extinction which are or may be affected by trade. Trade in Appendix I species is allowed only in exceptional, non-commercial circumstances and only with permits from both the exporting and importing country. Appendix II species include species which, while not now threatened with extinction, may become so unless trade in such specimens is subject to strict regulation. Export permits are required from the country of export, and both exporting and importing countries must monitor the use of those permits. Trade in Appendix III species requires a certificate of origin and an export permit based on a finding of legal acquisition and satisfaction of preparation and shipping conditions. Listing or de-listing of species in Appendix I or II requires consideration by the Conference of the Parties of species proposals submitted by Parties. To succeed, such proposals must gain a two-thirds majority in a vote of the Parties. Individual Parties can list species under their jurisdiction in Appendix III for the purpose of preventing or restricting exploitation or if they deem a need for cooperation in controlling the trade. A Party may take a reservation to the listing of a species on Appendix I or II within 90 days of the vote and anytime after the addition of a species to Appendix III. As the trade impact or other threats to a species increase or decrease, species may be shifted between, added to, or removed from these Appendices.

CITES also regulates international trade through a system of import and export permits that are required before specimens leave a country. Each Party must appoint a CITES Management Authority and a CITES Scientific Authority. The Fish and Wildlife Service, Department of the Interior, is the Management Authority and Scientific Authority for CITES for the United States and also plays the major law enforcement role. The Management Authority is responsible for issuing permits and implementation of the trade controls of the convention, as well as maintaining records of trade in specimens in the Appendices. The Scientific Authority is responsible for making scientific findings on whether trade will be detrimental to the survival of a species and for monitoring the export permits granted against the actual level of trade for a species. CITES also requires law enforcement capability to enforce the CITES provisions and penalize illegal trade.

With respect to implementation, the U.S. implements CITES primarily through regulations developed under the Endangered Species Act as well as enforces it through other existing laws such as the Lacey Act. The United States ensures compliance through extensive regulatory systems; Washington based policy, scientific and permitting offices; and enforcement personnel at designated CITES ports. These are administered by the Fish and Wildlife Service, Department of Interior and/or the Animal and Plant Health Inspection Service, Department of Agriculture.

The United States is proud of its record in implementing its CITES obligations. We are at the forefront of CITES parties in fulfilling these obligations. CITES studies have recognized these accomplishments. For example, one determined that the United States has effective national legislation implementing CITES obligations, and another found that the United States was effectively controlling the trade in tigers and tiger parts. A strong and professional staff at the Fish and Wildlife Service, together with good coordination with the State Department, the Animal and Plant Health Inspection Service and other agencies, have made this notable success possible.

UN Framework Convention on Climate Change (UNFCCC)

Negotiations that led to the U.N. Framework Convention on Climate Change (UNFCCC) began in Chantilly, Virginia, in February 1991 at the invitation of Presi-

dent George H.W. Bush. The negotiations concluded on May 9, 1992, in New York where the convention was adopted. It was subsequently opened for signature at the June 1992 U.N. Conference on Environment and Development (UNCED). The UNFCCC entered into force on March 21, 1994, after ratification by 50 Parties. The United States ratified the UNFCCC on October 15, 1992, becoming the first industrialized Nation and the fourth Nation overall to do so. As of July 2002, the UNFCCC has 186 Parties.

The UNFCCC creates a broad global framework for addressing the challenge of climate change. It establishes an objective, commitments for different groups of countries, and a set of institutions to enable governments to consider and adopt appropriate actions and to monitor the Convention's implementation. The Convention groups countries into two annexes. Annex I lists most members of the Organization for Economic Cooperation and Development (OECD) plus the states of Central and Eastern Europe as well as several states of the Former Soviet Union. Prior to the year 2000, Annex I Parties were to adopt policies and measures aimed at returning their greenhouse gas emissions to 1990 levels. Annex II lists a smaller subset of Annex I Parties who agreed to provide financial resources to assist developing countries in implementing their Convention commitments.

The ultimate objective of the Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic [human-induced] interference with the climate system. The Convention's objective further provides that: "Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

All Parties to the Convention are committed to respond to climate change and to cooperate in various ways toward this end. In particular, each Party is required to prepare and submit a national inventory of its emissions by sources and removals by sinks (forests and other natural systems that remove greenhouse gases from the atmosphere) of greenhouse gases. Each party is also required to prepare a national communication describing the steps it is taking to implement the Convention. The United States submitted its Third National Communication (the U.S. Climate Action Report) to the Convention's secretariat in May 2002.

In addition, the Convention requires that all Parties:

- Formulate national or regional programs containing measures to mitigate climate change;
- Promote the development and diffusion of technologies that control, reduce or prevent greenhouse gas emissions;
- Promote sustainable management and conservation of sinks and reservoirs of greenhouse gases;
- Cooperate in preparing for adaptation to the impacts of climate change;
- Take climate change considerations into account to minimize adverse effects of steps taken to mitigate or adapt to climate change on the economy, on public health, and on the quality of the environment by carefully considering climate change actions;
- Promote and cooperate in research, systematic observation and the development of data archives related to the climate system so as to further understanding and reduce uncertainties about the causes, effects, magnitude and timing of climate change and the consequences of response strategies;
- Promote and cooperate in the full, open and prompt exchange of scientific and other information related to the climate system and the consequences of response strategies, and
- Promote and cooperate in education, training and public awareness related to climate change.

Annex I Parties have more extensive requirements under the Convention to report on the steps they are taking to address climate change and, as noted, prior to the year 2000 they were to aim to return their emissions of greenhouse gases to 1990 levels. Annex II Parties have certain additional requirements under the Convention. They agreed to provide financial assistance to developing country Parties to help them meet their Convention commitments, and they agreed to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation to those adverse effects. Annex II Parties also agreed to assist other Parties, particularly developing country Parties, with technology transfer and access to environmentally sound technologies and know-how.

The Global Environment Facility serves as an operating entity of the Convention's financial mechanism. All Annex II Parties contribute to the Global Environment Fa-

cility, including the United States. In addition, however, developed country Parties may also provide financial resources related to the implementation of the Convention through bilateral, regional and other multilateral channels. The U.S. Climate Action Report contains detailed information both with respect to U.S. contributions to the GEF as well as with respect to the other means through which the United States is meeting its obligations under the Convention.

The work of the Convention takes place in two subsidiary bodies—the Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation—which meet normally twice a year to prepare for an annual meeting of the Conference of the Parties, the supreme body under the Convention. The subsidiary bodies held their most recent session from June 3–14 in Bonn, Germany, the seat of the Convention's secretariat. The 8th Conference of the Parties will take place from October 23 to November 1, 2002, in New Delhi.

Negotiations to strengthen the commitments of Annex I Parties began in 1995, following a decision—the so-called "Berlin Mandate"—taken at the first session of the Conference of the Parties. In July 1997, the Senate adopted the Byrd-Hagel Resolution by a vote of 95–0 urging the administration to sign no agreement that would harm the U.S. economy or that did not contain specific scheduled quantified commitments for developing countries. In December 1997, Parties to the Convention adopted the Kyoto Protocol at their third session. The United States signed the Kyoto Protocol on November 12, 1998. The previous administration never subsequently sent the Protocol to the Senate for advice and consent, maintaining that the Kyoto Protocol was a "work in progress" and that key developing countries would need to agree to "meaningful participation" for the United States to ratify it.

After taking office in 2001, President Bush announced that the United States would not ratify the Kyoto Protocol because it would harm the U.S. economy and it contained no commitments for 80 percent of the world. At the same time, the President indicated that each Nation must decide whether to ratify the Kyoto Protocol based on an assessment of its national interest and that the United States would not interfere with the decisions of other nations in this regard. As of July 2002, 74 nations and one regional economic integration organization (the European Union) had ratified or acceded to the Kyoto Protocol. Collectively, these countries represent 36 percent of the 1990 carbon dioxide emissions of the Convention's Annex I Parties. Under its terms, the Kyoto Protocol will enter into force once 55 Parties to the Convention, incorporating Parties included in Annex I which accounted for at least 55 percent of the total carbon dioxide emissions for 1990 of the Parties included in Annex I, have deposited their instruments of ratification, acceptance, approval or accession.

President Bush has made two major announcements of U.S. policy regarding global climate change—on June 11, 2001, and on February 14, 2002. Both of these announcements call for intensified efforts with other nations to address the challenge of climate change. Toward this end, the United States has initiated a series of bilateral climate change relationships with important partners, including: Australia, Central America (CONCAUSA), the European Union, Canada, China, India, Italy and Japan. Discussions toward additional climate change relationships have begun or are contemplated also with: Brazil, Mexico, the Republic of Korea, the Russian Federation, South Africa and Ukraine.

These bilateral climate change relationships range from those devoted largely to undertaking cooperative science and technology projects to those that may focus more on the exchange of information and views related to climate change policy. Along this continuum—from S&T projects at one end to policy at the other—each relationship usually involves a particular mix of the two. In the case of Japan, for example, we have three working groups focused on: (1) S&T cooperation; (2) developing countries; and (3) market mechanisms.

Both with our continued, active participation under the UNFCCC and in our bilateral relationships that complement and enhance our multilateral cooperation, we are seeking to build relationships that will enable us and others to address the long term challenge of climate change on a balanced and measured basis, consistent with the need to ensure the continued economic prosperity for our citizens and our Nation.

North American Agreement on Environmental Cooperation

The North American Agreement on Environmental Cooperation (NAAEC), commonly referred to as the NAFTA environmental side agreement, serves as an important framework for cooperation among the three North American governments on a wide range of environmental affairs. Among other things, the NAAEC established the Commission on Environmental Cooperation (CEC), which coordinates such cooperation. The United States remains committed to the agreement, which has been

in force since 1994, and to the North American environmental cooperation that takes place under it.

The Commission established by the agreement is composed of a Council, a Secretariat and a Joint Public Advisory Committee. The Council is the governing body, and is composed of representatives of the governments. The three environment ministers represent their governments on the Council. The EPA Administrator is the designated U.S. representative on the Council and EPA has lead responsibility for managing the interagency process that develops U.S. positions and guides our participation in the CEC. The Department of State works closely with EPA and maintains responsibility on all questions regarding the interpretation of the agreement. We play an active role in implementation of the NAAEC and in developing work through the CEC.

The NAAEC is notable for a high degree of citizen participation. A trilateral Joint Public Advisory Committee (JPAC) participates in CEC deliberations, including direct interaction with the Council. The governments each appoint five members to the JPAC, who represent a wide array of stakeholders from industry, academia, and nongovernmental organizations. Each country also maintains governmental and/or non-governmental domestic advisory bodies. The structure of the CEC has produced fluid communication among our countries that has enhanced significantly our broader relationships.

The NAAEC also contains a public submission process in which citizens may submit claims to the Secretariat regarding the failure of a government to enforce its environmental laws and the Council may direct the development and release of a "factual record" concerning the claim in response.

The NAAEC has promoted strong cooperation among the three countries on a number of important environmental issues, achieved primarily through implementation of the CEC work program funded at US$9 million annually with equal contributions by the Parties. These include promotion of enforcement of and compliance with environmental laws, protecting children's environmental health, protecting animal species that migrate throughout North America, and minimizing the use of certain persistent toxic chemicals such as DDT. Trilateral cooperation under the NAAEC has provided an impetus for the development of certain types of environmental legislation, particularly the new mandatory Pollutant Release and Transfer Register in Mexico.

The United States has fully complied with our obligations under the NAAEC. Unlike some other environmental agreements that call for very specific actions or the achievement of specific targets in a designated timeframe, the NAAEC sets up a general framework for cooperation, which is then developed and implemented over time through the CEC. This has proven to be an effective framework for promoting environmental cooperation within North America.

The U.N. Convention to Combat Desertification

The U.N. Convention to Combat Desertification (UNCCD) arose out of the 1992 Earth Summit in Rio de Janeiro at which African countries argued that the U.N. Framework Convention on Climate Change and the Convention on Biological Diversity did not address their major concern—desertification. Desertification—the degradation of dry lands—is not limited to Africa: it affects millions of people inhabiting one quarter of the world's land area from the American west, to the Aral Sea in Russia, to Argentina and the islands of the Caribbean, Indonesia and the Mediterranean.

The United States played a key role in negotiating the UNCCD—a role which is a natural outgrowth of the United States' experience during the Dust Bowl of the 1930's and our long-standing concern about desertification in developing countries, particularly in Africa. Negotiations on the CCD concluded in June 1994 and the Convention entered into force in December 1996.

The purpose of the Convention is to combat desertification and mitigate the effects of drought on arid, semi-arid, and dry sub-humid lands through effective local, national, regional and global action, particularly in Africa. The Convention's central objective is to promote the sustainable use of drylands worldwide, but especially in Africa, and to make more efficient use of aid resources, thereby helping to solve Africa's and other affected regions' chronic hunger problems. The CCD employs a unique grass-roots approach, emphasizing a "bottom-up" approach with strong local participation in decisionmaking.

Under the Convention, the United States, with approximately 40 percent of our landmass considered arid, semi-arid or dry sub-humid and therefore susceptible to the processes of desertification, is an affected Party. As an affected Party, the United States is required to have strategies to address desertification. Given our extensive system of land management strategies, practices and programs, no changes

were or are required in our domestic policies or programs for the U.S. to meet this obligation under the Convention. (The Convention acknowledges that Parties may implement their obligations through "existing or prospective" arrangements). Many of the principles used successfully in the U.S. over the past 70 years have been incorporated in the language of the Convention. All Parties are required to submit reports to the Secretariat of the CCD on activities undertaken in support of the CCD, on a timetable determined by the Conference of the Parties. The first U.S. Report on Activities Undertaken in Support of the U.N. Convention to Combat Desertification was officially submitted July 3, 2002.

The United States is also required to provide support for developing country efforts to combat desertification, including by providing financial resources, although the Convention does not impose a specific amount or timing with respect to this requirement.

The U.S. Agency for International Development (USAID) is the lead U. S. government agency implementing the CCD overseas. The Department of the Interior (Bureau of Land Management) and the Department of Agriculture also carry out program activities in support of the implementation of the Convention. Bilaterally and regionally, the United States works with affected developing country Parties, local and international non-governmental organizations, and multilateral development banks on anti-desertification program activities, including education, community development, and capacity building, with the goal of empowering local people to combat desertification by identifying needs and solving problems themselves. An important aspect of CCD implementation is the dissemination of technology and scientific and technical information. The U.S. has made and will continue to make an important contribution in this area, given our 70 years of experience combating desertification in the American West.

Looking Ahead

While significant progress in protecting the environment has been made, enormous challenges lie ahead. The upcoming World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa, provides the United States with a unique opportunity to take stock of our past accomplishments and to build on them in helping to advance economic and social growth and environmental stewardship. We have learned a great deal since the Rio Earth Summit. WSSD gives us a chance to create a new paradigm that stresses sound economic policies, national capacity for good governance, anti-corruption, transparency and the role of science. The Bush Administration is committed to its success.

RESPONSES OF JAMES F. TURNER TO ADDITIONAL QUESTIONS FROM SENATOR JEFFORDS

Question 1. Please provide a complete list of the status of all environmental treaties that the United States has signed and ratified (or only signed) since 1945, including all dates of signature and ratification. Please note the environmental treaties since 1945 that the United States has neither ratified nor signed.

Response. The State Department does not maintain a separate data base of environmental treaties, and is in the process of compiling the requested information from the official records.

Question 2. What is the best way for the public to determine whether the United States is complying with its international environmental agreements?

Response. One useful method is to review the obligations contained in the agreements and consider what steps the United States has taken with respect to each such obligation. In some cases the latter will involve considering a wide range of U.S. Government programs and activities.

Question 3. Your boss, Ms. Dobriansky, and others in the Administration have been quoted as saying "Sustainable Development begins at home." What exactly does that mean and how is it measured?

Response. The Administration uses the phrase "sustainable development begins at home" to describe a provision in the agreement reached at the U.N. Conference on Financing for Development in Monterrey, Mexico in March this year, specifically, "Each country has primary responsibility for its own economic and social development . . ." We advocate that development be sustainable, and that to achieve this sustainable development, nations must practice good domestic governance. Good domestic governance is characterized by robust democratic institutions (including a popularly elected legislature and an independent judiciary); effective measures to combat corruption; adherence to the rule of law (i.e., fair and consistent application of law); public participation in decisionmaking; and the use of sound science to guide

those government decisions to the extent possible. A country that is not committed to these goals, including being good stewards of its natural resources, cannot expect development to occur optimally, because the full range of development resources, both domestic and foreign, will not be mobilized and effectively used to foster economic and social development and environmental protection. International cooperation and development assistance will continue to play an important support role. However, the commitment to sustainable development, and to establish the needed framework to promote such development must begin domestically.

Question 4. One of the purposes of the World Summit is to re-energize efforts at the national level in regard to sustainable development and the implementation of Agenda 21. What domestic actions is the Administration considering as followup to Johannesburg?

Response. The Administration plans to continue efforts to implement Agenda 21 through a number of mechanisms including innovative public-private partnerships. The Council on Environmental Quality, the Environmental Protection Agency, Department of the Interior, Department of Commerce, Department of Agriculture and other government agencies are actively working with the public and private sectors to ensure that sustainable development is a priority? at the national level.

Question 5. Could you please provide a list for the record of the U.S. delegation representatives that will be attending, and the list of U.S. delegation representatives that attended the Rio Earth Summit?

Response. We have attached a provisional list of the U.S. delegation to the World Summit on Sustainable Development and a list of the U.S. delegation to the United Nations Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro in 1992.

UNITED STATES DELEGATION TO THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT, JOHANNESBURG, AUGUST 26—SEPTEMBER 4, 2002

Ex Officio Head of Delegation
The Honorable Colin L. Powell
Secretary of State

Representatives

The Honorable Paula J. Dobriansky
Under Secretary for Global Affairs
Department of State

The Honorable John F. Turner
Assistant Secretary for Oceans and International Environmental and Scientific Affairs
Department of State

Alternate Representatives

The Honorable Claude A. Allen
Deputy Secretary
Department of Health and Human Services

The Honorable Robert G. Card
Under Secretary for Energy, Science and Environment
Department of Energy

The Honorable James L. Connaughton
Chairman
Council on Environmental Quality
Executive Office of the President

The Honorable Linda J. Fisher
Deputy Administrator
Environmental Protection Agency

The Honorable Cameron R. Hume
United States Ambassador
Pretoria

The Honorable Conrad C. Lautenbacher, Jr.
Under Secretary for Oceans and Atmosphere
National Oceanic and Atmospheric Administration
Department of Commerce

Jonathan A. Margolis
Director
Office of Policy Coordination and Initiatives
Bureau of Oceans and International Environmental and Scientific Affairs
Department of State

Richard T. Miller
Deputy Assistant Secretary
Bureau of International Organization Affairs
Department of State

The Honorable James R. Moseley
Deputy Secretary
Department of Agriculture

The Honorable Andrew S. Natsios
Administrator
Agency for International Development

Anthony F. Rock
Principal Deputy Assistant Secretary
for Oceans and International
Environmental and Scientific Affairs
Department of State

The Honorable Sichan Siv
Ambassador
United States Representative to the
Economic and Social Council
United States Mission to the United
Nations

The Honorable Peter S. Watson
President and Chief Executive Officer
Overseas Private Investment
Corporation

The Honorable Christine Todd Whitman
Administrator
Environmental Protection Agency

Senior Advisers
Alan Hecht
Council on Environmental Quality
National Security Council
Executive Office of the President

Donald K. Steinberg
Deputy Director
Office of the Policy Planning Staff
Department of State

Advisers
Kate Almquist
Special Assistant
Office of the Administrator
Agency for International Development

Christo Artusio
Office of Global Change
Bureau of Oceans and International
Environmental and Scientific Affairs
Department of State

Deborah M. Atwood
Special Assistant to the Deputy
Secretary
Department of Agriculture

The Honorable Judith E. Ayres
Assistant Administrator for
International Affairs
Environmental Protection Agency

Adela Backiel
Director of Sustainable Development
Department of Agriculture

Janice F. Bay
Deputy Assistant Secretary
Bureau of Economic and Business
Affairs
Department of State

John Beale
Deputy Assistant Administrator
Environmental Protection Agency

Karin Berry
Senior Policy Analyst
Department of Energy

Robert Blair
Office of International Health Affairs
Bureau of Oceans and International
Environmental and Scientific Affairs
Department of State

Evan T. Bloom
Office of the Assistant Legal Adviser
for Oceans and International
Environmental and Scientific Affairs
Office of the Legal Adviser
Department of State

The Honorable Richard A. Boucher
Assistant Secretary for Public Affairs
and Department Spokesman
Department of State

Marcel Bouquet
Interpreter
Office of Language Services
Department of State

Sarah K. Brandel
Office of Ocean Affairs Bureau of
Oceans and International
Environmental and Scientific Affairs
Department of State

William J. Brennan
Deputy Assistant Secretary
National Oceanic and Atmospheric
Administration Department of
Commerce

Gayleatha Brown

Counselor for Political Affairs
United States Embassy
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Lori Brutten
Office of Policy Coordination and Initiatives
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Stephanie Childs
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Brent Christensen
Economic Officer
United States Embassy Beijing

Cynthia Church
Deputy Press Secretary
Department of State

Karen Clark
Department of the Interior

Lawrence E. Clark
Associate Chief
Natural Resource Conservation Service
Department of Agriculture

Gerald Clifford
Deputy Assistant Administrator
Office of International Activities
Environmental Protection Agency

Sally D. Collins
Associate Chief
United States Forest Service
Department of Agriculture

William E. Craft
Director
Office of Multilateral Trade Affairs
Bureau of Economic and Business Affairs
Department of State

Jonathan Crock
Office of the Ambassador-at-Large For War Crime Issues
Department of State

The Honorable Patrick M. Cronin
Assistant Administrator
Agency for International Development

Wayne D'Angelo
Advance Director
Environmental Protection Agency

John Davison
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United States Mission to the United Nations

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Yale Law School
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Hempstead, New York

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F. Sherwood Rowland
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Irvine, California

Chris Tucker
Actor and Comedian
Los Angeles, California

UNITED STATES CONGRESSIONAL OBSERVER DELEGATION TO THE WORLD SUMMIT ON SUSTAINABLE DEVELOPMENT JOHANNESBURG, AUGUST 26—SEPTEMBER 4, 2002

Members of the House of Representatives
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House of Representatives

The Honorable Earl Blumenauer
House of Representatives

The Honorable James C. Greenwood
House of Representatives

The Honorable Dennis J. Kucinich
House of Representatives

The Honorable George Miller
House of Representatives

The Honorable Christopher Shays
House of Representatives

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House of Representatives

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Office of Senator Chuck Hagel
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U.S. Senate

Alison Leigh Taylor
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Committee on Environment and Public Works
U.S. Senate

The following Congressional Staff spouse will accompany the delegation: Jacqueline Kae DesChamps.

Question 6. What measures should we look at to determine whether U.S. programs and resources are achieving the goals of Agenda 21?

Response. There are a number of measures that could be considered to evaluate our progress in achieving the goals of Agenda 21. The body of international environmental agreements to which the United States is a party provides one important measure. Beyond U.S. participation in and implementation of treaties and conventions, however, is an important body of domestic activities undertaken by both the U.S. Government and the private sector to advance sustainable development objectives. Examples of government activities include enactment and implementation of Brownfields legislation (to promote cleanup and reuse of contaminated land) and TEA–21 (which, among other things, promotes sustainable transportation) and voluntary policy initiatives such as the U.S.-led International Coral Reef Initiative (ICRI), the U.N. Forest Forum (which is developing a set of indicators for the sustainable management of the world's most endangered forest resources), and the Arctic Council (which has identified and implemented voluntary measures to reduce toxic chemicals that pose a particular bioaccumulation risk in animals and humans in polar regions). Voluntary measures implemented by the private sector in the United States, such as the Energy Star program for energy efficient appliances and the adoption of clean production technologies and methods, have also contributed significantly to achievement of the goals of Agenda 21.

Question 7. The Administration has strongly promoted the concept of concrete "partnerships," or Type II initiatives, including ones on sustainable energy and clean water. What is the status of these efforts and does the Administration plan to provide new financial resources for such partnerships? How will the Administration guarantee that voluntary partnerships will deliver real progress for sustainable development, especially if they are not designed to implement specific international agreements with targets and timetables? How can the Administration guarantee

that any partnerships that involve corporations are carried out in a responsible manner if there is no independent oversight framework?

Response. The United States is proposing four "signature" partnerships that have been created as a result of preparations for WSSD. These are in the fields of energy, water, hunger and forests. These partnerships are "coalitions of the willing", voluntary in nature and open to those governments, NGO's, private sector entities, and civil society groups who wish to participate. In other words, they do not require the negotiation of an international treaty, but rather are invitations to cooperate to achieve a shared goal. We would expect that each partnership would identify its goals and periodically provide a report on its progress. Such reports should be accessible and open to the public. The Commission on Sustainable Development could be used as the forum in which partnerships provide their reports, further increasing transparency and thereby accountability. The Administration plans to finance these partnerships through existing resources.

Question 8. The Administration has (rightly) been very strong on the importance of "good governance" to sustainable development. The President announced in a speech at the Inter-American Development Bank on March 14 that the United States will increase its core development assistance by 50 percent over the next 3 years, resulting in a $5 billion annual increase over current levels. These additional funds will go to a new Millennium Challenge Account that will fund initiatives to help developing nations improve their economies and standards of living. The Millennium Challenge Account will set criteria for how the additional $5 billion the United States has pledged will be allocated. But "good governance" does not come cheap. How does the Administration propose to assist countries to bring about "good governance," as opposed to rewarding countries exhibiting it? How much of U.S. aid is currently spent on "good governance"?

The Federal Government currently funds many programs that promote good governance across in almost every developing country of the world. U.S. assistance for governance programs was over $1.5 billion in fiscal year 02 for programs supporting, among other things; policy training for civil servants and elected officials, government information management, promotion of civil society groups, election monitoring, anti-corruption, judicial and prosecutorial. capacity-building, women's and workers' rights, public-private partnerships, and food security. These programs, among many others, will continue within the framework of existing development assistance.

Tbe MCA will be a new account that will supplement, not replace, existing programs. The MCA will assist countries that have made a commitment to ruling justly, investing in people, and promoting economic freedom. MCA funds will be distributed in flexible and innovative ways so that they can have a maximum impact on economic growth and poverty reduction. Country ownership is a critical component of the MCA. The uses of the funds will be determined by full engagement with recipient countries. We will partner with, not dictate to, MCA countries.

Competition for the MCA will inspire non-recipient countries to improve their performance on governance. Countries that do improve their performance will be in a position to compete for MCA funding in the future. Existing U.S. Government programs can help those countries that are willing to engage in serious policy reform.

Question 9. What are the criteria for the Millennium Challenge Account? Why is it proposed to announce these after WSSD? What will be' the role of environmental measures in the criteria? What environmental criteria will apply to expenditure of the funds?

Response. The Administration is still evaluating criteria to determine how funds from the Millennium Challenge Account would be disbursed. We are consulting with development partners in developed countries as well as with potential developing country recipients as we develop these criteria. This thorough process, which began immediately after the Financing for Development Summit in Monterrey in March, is independent of the timetable for WSSD.

Question 10. What effect has the U.S. farm bill had on U.S. negotiating capacity and leverage, particularly with respect to the issue of reducing environmentally harmful subsidies? How has this affected U.S. credibility?

Response. The United States is strongly committed to an ambitious outcome reducing global trade distortions in agriculture through the WTO. As Ambassador Zoellick has made clear, our strategy in pursuing this goal rests on a three-legged stool consisting of the new U.S. proposal for the Doha WTO negotiations to reduce agricultural subsidies, the U.S. Farm Bill, and trade promotion authority.

Many, particularly in the international community, have exaggerated the provisions in the U.S. Farm Bill and claimed it throws into question our true interest in seeking reduced agricultural subsidies. But the bottom line is that domestic sup-

port under the farm bill is entirely consistent with WTO obligations. Under WTO rules, the United States is allowed to provide up to $19.1 billion annually in "trade-distorting" support. The Farm Bill, for the first time, was consciously drafted with these limits in mind. Not only did Congress consider how support under the farm programs would be counted against the U.S.-allowed support level, but also it included an unprecedented "circuit breaker" mandating the Secretary of Agriculture to modify programs to ensure compliance with U.S. international obligations.

If other countries agree with the U.S. Government that world agricultural tariffs and subsidies are too high, we urge them to join us at the negotiating table. Congress has just renewed the President's trade promotion authority, and we believe a successful conclusion to the WTO negotiations will ensure congressional support for necessary modifications to our domestic agricultural programs required under any new WTO commitments.

Regarding environmentally harmful subsidies, it is worth noting that the farm bill pays directly for conservation programs that are important to the Americanpublic. This reflects our consistent stand that it is important for governments to support farmers and rural communities in ways that are targeted, transparent, and non-trade distorting. By setting these examples, the farm bill, if anything, strengthens the Administration's ability to work toward the environmental objectives laid out in the Trade Promotion Authority act.

Question 11. Please list all the new "Type I" commitments—the more conventional negotiated declarations and action plans—that the United States intends to enter into at WSSD.

Response. The text is still under negotiation. The final outcomes will be determined in Johannesburg. We will supply you with the final Johannesburg Plan of Action and political declaration after the Summit has ended. We note that any Type I outcomes will not be "commitments" in a legal sense because the WSSD outcomes. will all be non-binding.

Question 12. Explain the linkage between the Type I and Type II initiatives. Aren't strong Type II partnerships connected to having some type of concrete framework?

Response. The international community has already agreed to a large number of goals, targets and timetables. For example, the United States strongly supports the internationally agreed Millennium Declaration goals. In our view, partnerships are clearly linked to such goals in that partnerships are one of the main mechanisms through which to implement such goals.

Question 13. How many Type II partnerships is the United States proposing for WSSD? Where is the full list? What government agencies and private companies are to be involved?

Response. While the major Type II partnerships under development for WSSD are still under active review, they are outlined in the response to question 7. Broad inter-agency teams composed of relevant U.S.G agencies are working on these efforts. We welcome the broad participation of business, NGO's, and other major groups in such partnerships. We plan to continue building partnerships well after the Johannesburg Summit has finished: this is not a process that ends with the Summit.

Please see the attached list of our Type II partnerships.

UNITED STATES DELEGATION TO THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (UNCED) RIO DE JANEIRO, JUNE 3–14, 1992

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SUBJECT: CONGRESSIONAL DELEGATION TO THE UNITED NATIONS CONFERENCE ON ENVIRONMENT AND DEVELOPMENT (UNCED) RIO DE JANEIRO, JUNE 3–14, 1992

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U.S. Senate

The Honorable John N. Chafee (Vice Chairman of the Senate Delegation)
U.S. Senate

The Honorable Max Baucus
U.S. Senate

The Honorable Bob Graham
U.S. Senate

The Honorable John Kerry
U.S. Senate

The Honorable Frank H. Lautenberg
U.S. Senate

The Honorable Claiborne Pell
U.S. Senate

The Honorable Larry Pressler
U.S. Senate

The Honorable Steve Symms
U.S. Senate

The Honorable Paul Wellstone
U.S. Senate

The Honorable Timothy B. Wirth
U.S. Senate

B. MEMBERS OF THE HOUSE OF REPRESENTATIVES

The Honorable George Miller (Chairman of the House Delegation)
U.S. House of Representatives

The Honorable Anthony C. Beilenson
U.S. House of Representatives

The Honorable Ben C. Blaz
U.S. House of Representatives

The Honorable Cardiss Collins
U.S. House of Representatives

The Honorable Robert W. Davis
U.S. House of Representatives

The Honorable Edward F. Feighan
U.S. House of Representatives

The Honorable Benjamin A. Gilman
U.S. House of Representatives

The Honorable Bill Green
U.S. House of Representatives

The Honorable Dennis N. Hertel
U.S. House OF Representatives

The Honorable Nancy Pelosi
U.S. House of Representatives

The Honorable James H. Scheuer
U.S. House of Representatives

The Honorable Gerry Sikorski
U.S. House of Representatives

The Honorable Robert C. Torricelli
U.S. House of Representatives

The Honorable Jolene Unsoeld
U.S. House of Representatives

1

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Charly Moore
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Joan Teague Rose
Staff Assistant

2. Following Congressional spouses will accompany the delegation: Tipper Gore, Virginia Chafee, Nuala Pell, Harriett Pressler, Loretta Symms, Wren Wirth, Adele Graham, Ann Blaz, Nadine Feighan, Paul Pelosi and Emily Scheuer.

Question 14. How and what is the United States commitment to WEHAB (Water, Energy, Health, Agriculture, and Biodiversity)? What specific actions will we take in these areas?

Response. WEHAB refers to the acronym that Secretary General Kofi Annan proposed as priority areas for the Johannesburg Summit. We support all five of the areas identified: water, energy, health, agriculture, and biodiversity. The development assistance programs run by USAID, USDA, EPA and other Federal agencies clearly reflect an emphasis in these areas, as a survey prepared by USAID with input from over 15 U.S. agencies indicates. Please see the attached document, "Working for a Sustainable World: Government Initiatives to Promote Sustainable Development."

Working for a Sustainable World

U.S. Government Initiatives
to Promote Sustainable Development

Full Report
August 2002

"Countries that live by these three broad standards—ruling justly, investing in their people, and encouraging economic freedom—will receive more aid from America. And, more importantly, over time, they will really no longer need it, because nations with sound laws and policies will attract more foreign investment. They will earn more trade revenues. And they will find that all these sources of capital will be invested more effectively and productively to create more jobs for their people.

My administration will adopt a new spirit of respect and cooperation, because, in the end, that is the better way to protect the environment we all share—a new environmentalism for the 21st century. Citizens and private groups play a crucial role. Just as we share an ethic of stewardship, we must share in the work of stewardship. Our challenge is to work in partnership."

President George W. Bush
March 14, 2002 and May 30, 2001

"We live in a century of promise. Our responsibility now is to turn it into a century of hopes fulfilled, a century of sustained development that enriches all our peoples without impoverishing our planet. When we talk of sustainable development, we are talking about the means to unlock human potential through economic development based on sound economic policy, social development based on investment in health and education, and responsible stewardship of the environment that has been entrusted to our care by a benevolent God.

Sustainable development is a marathon, not a sprint. It does not follow from a single event like the Johannesburg Summit, important as that meeting may be, but from a sustained global effort by many players working together over a long period of time. Sustainable development requires institutions, policies, people, and effective partnerships to carry out our common effort beyond Johannesburg and well into the future."

Secretary of State Colin L. Powell
July 12, 2002

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Executive Summary

This report distills the results of a survey of 400 sustainable development initiatives supported by the U.S. Government. While the survey is not exhaustive, it reveals a wide range of U.S. departments and agencies making substantial commitments to achieve sustainable development using varied and novel strategies in practically all developing and transition countries. Further, the survey shows the U.S. Government is working to leverage economic and social resources from the private, nonprofit, and academic communities.

U.S. policy, reflecting broad international consensus on how to promote sustainable development, rests on three pillars: fostering economic growth, investing in people (particularly education and health), and promoting stewardship of natural resources.

Good governance is necessary for sustainable development. To strengthen governance, the U.S. Government promotes conflict resolution, competitive elections, and democratic systems; strengthens judicial systems; and helps developing and transition countries better manage natural resources.

Other initiatives address human resources, seeking to improve education and health. Health initiatives fight HIV/AIDS, tuberculosis, and malaria, and support population planning and maternal and child health. The U.S. Government also invests in improving basic education and ending child labor, and in science and technology training that can meet environmental challenges.

The report focuses on how U.S. policy is translated into action through partnerships to mobilize public sector, private sector, and civil society resources for sustainable development. There are four principal types of partnerships:

- *The nonprofit sector:* The United States helps nongovernmental organizations become active partners in sustainable development.
- *Private sector finance:* The United States promotes market development through project-specific alliances with the very poor in microenterprise initiatives and preparing economies to attract private finance.
- *Public-private partnerships:* The United States creates synergies across nongovernmental organizations, private sector firms, foundations, academia, and public institutions.
- *Science and technology partnerships:* Many U.S.-supported programs provide data for sustainability initiatives around the world. The United States is the leading source of scientific and technological innovations and is committed to sharing this bounty.

These partnerships address critical issues like energy, water resources, and biodiversity. Some, like the world's largest climate and global change research program, are notable for their magnitude; others, like the Caspian Environmental Partnership Program, are notable for their mobilization of private resources to strengthen cooperation among nongovernmental organizations, the business sector, and government. ■

Introduction

"The Johannesburg Summit aims to find practical ways for humanity to respond to… better the lives of all human beings, while protecting the environment. The Summit also aims to move from commitments—of which we have had plenty—to action."

UN Secretary General
Kofi Annan
May 14, 2002

Background

This report, prepared for the World Summit on Sustainable Development, highlights current U.S. actions and programs that further sustainable international development. It summarizes a survey of 22 U.S. Government agencies on their international sustainable development initiatives. Agencies returned information on more than 400 such initiatives. These demonstrate the commitment of the United States to helping developing and transition countries promote economic growth, vibrant civil societies, and protection of the environment. This report offers students, policymakers, and development practitioners greater insight into how the United States is addressing the complex challenges of creating a sustainable world.

The survey and the case studies featured in this report reveal the engagement of numerous governmental entities, experts, and financial resources to strengthen the three pillars of sustainable development—economic growth, investment in people, and environmental stewardship. While the survey is not an exhaustive catalogue, its data fairly illustrate the kinds of work in sustainable development that the U.S. Government supports. The case studies presented describe dynamic partnerships with nongovernmental organizations (NGOs), the private sector, and experts in science and technology, as well as innovative approaches to mobilizing resources to achieve sustainable development. These strategies hold promising possibilities for achieving the aims of the World Summit on Sustainable Development.

In 1987, the UN's World Commission on Environment and Development defined sustainable development as "development which meets the needs of the present without compromising the ability of future generations to meet their own needs." The United States is helping people in developing and transition countries to meet their own needs in sustainable ways.

What Makes Development Sustainable

Sustainable development requires three fundamental strategies: promotion of economic growth to provide resources; investment in people, particularly in basic education and health services; and good environmental stewardship, which is dependent upon improved resource management, good governance, and application of new technologies. Growth needs to be consistent with good stewardship and must not preclude opportunities for future generations.

Governance that rules justly is also an essential prerequisite for sustainable development. Governments must

assure access to quality health care and education, whether provided by public or private means. Governments must promote economic freedom so that growth can take place. Governments must also set the rules and responsibilities for good environmental stewardship. Good governance also permits societies to function productively, providing the social investments that enable people to flourish. A well-functioning and progressing society will be economically productive enough to afford investments in social development and resource stewardship. Such societies will apply new technologies in their quest for sustainability and will attract sufficient domestic and international investment to preclude further aid dependency.

The primary responsibility for sustainable development rests with domestic governments, who must establish their own courses of action, their own capacities for effectiveness, and their own mobilization of social and economic forces for the common good.

How the United States Supports Sustainable Development

The United States believes that better-off countries must assist poorer countries that are working effectively on the fundamentals of sustainable development. The obligation is moral as well as practical. Leading to the Johannesburg Summit, the United States took numerous actions that support sustainable development, including the following:

- Announced that core development assistance will be increased by $5 billion above current levels by 2006, an increase of 50 percent over current levels. This increase will be managed through a Millennium Challenge Account, which aims to recognize countries that demonstrate commitment to sound policies that support economic growth.
- Launched the Global Development Alliance to foster public–private partnerships.
- Announced a $500 million initiative for International Mother and Child HIV Prevention over the next five years for Africa and the Caribbean, and raised its pledge to the Global Fund to Fight HIV/AIDS, Tuberculosis, and Malaria to $500 million.
- Announced an initiative to support primary education in Africa, with funding of $200 million over five years.
- Announced a commitment to increase the number of Peace Corps volunteers over the next five years to help people at the grassroots level meet their communities' sustainable development needs.
- Requested increased support for agricultural development—by 25 percent in FY[1] 2003 over FY 2002.
- Invested $1.5 billion in trade capacity building in developing and transition counties between 1999 and 2001.
- With its partners, worked to increase World Bank grants (rather than concessional loans) to the poorest of developing countries.
- Plans to increase expenditures for climate-change-related programs and activities by an expected $653 million.

"America supports the international development goals in the UN Millennium Declaration, and believes that these goals are a shared responsibility of developed and developing countries."

President George W. Bush
March 14, 2002

1. In the United States, the fiscal year (FY) begins on October 1.

"We fight against poverty because opportunity is a fundamental right to human dignity. We fight against poverty because faith requires it and conscience demands it."

President George W. Bush
March 22, 2002

Building International Consensus

U.S. policies and initiatives reflect the consensus of the global community on the fundamentals of sustainable development. Its three pillars—economic growth, social progress, and environmental stewardship—were elucidated at the Earth Summit of 1992. Over the last several years, multilateral, UN conferences, the Development Assistance Committee of the OECD, and the UN Millennium Summit contributed to a growing global consensus.

Together, they helped articulate strategies that promote sustainable development. Agreed aims in poverty reduction and social development were expressed as the Millennium Development Goals.

At the World Trade Organization's conference in Doha, Qatar, in November 2001, trade ministers committed themselves to an inclusive trading system that promotes sustainable development. The ministers agreed that an open and nondiscriminatory multilateral trading system and the protection of the environment "can and must be mutually supportive." The meeting instigated a pro-development round of trade negotiations. Trade flows with developing and transition countries now amount to $2.4 trillion per year.

The Doha conference created a new climate for constructive forward movement on development issues. The UN Conference on International Financial Development, held in Monterrey, Mexico, in March 2002, marked the next step in an extraordinary year of progress. Addressing finance for development and poverty reduction, the conference witnessed commitments made by the United States and the European Union that totaled $12 billion per year in new aid by 2006. This figure represents a momentous change after years of declining global aid levels.

Participants at Monterrey agreed that the global economy is a powerful engine for development, and that each country must take on the responsibility of harnessing it by practicing good governance, adhering to the rule of law, investing in people, and encouraging political and economic freedom.
Two other important conferences amplified key components of sustainable development. In May 2002, the UN General Assembly's Special Session on Children reviewed progress since 1990, articulating goals and indicators for further progress. The following month, the World Food Summit: Five Years Later reviewed ways to cut poverty by half by 2015. These international meetings emphasized the prerequisite of good governance, the importance of stimulating finance for development, and the necessity of assuring effective stewardship of natural resources for the benefit of coming generations.

U.S. Economic Leadership

U.S. imports from developing countries in 2001	$449 billion
U.S. official development assistance in 2001	$11 billion
U.S. annual private capital investment in developing countries, 1997–2000	$36 billion
U.S. private charitable donations to developing countries in 2000	$4 billion
U.S. humanitarian assistance and food aid in 2001	$2.5 billion
U.S. contribution to multilateral development banks, 2002–2003	$1.4 billion

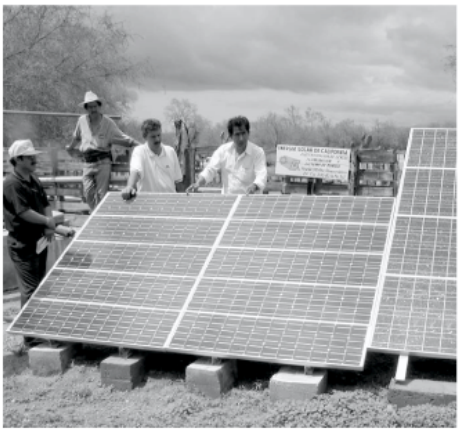
How the Report Is Organized

This report begins by reviewing collaboration to increase the effectiveness of governance. It continues with a chapter on investing in people—mainly in education and health. It draws attention to partnerships for sustainable development: strategies that strengthen NGOs, leverage private sector finance, and collaborate with the scientific community. The report concludes with a discussion of partnerships and collaboration in key areas of resource stewardship, including climate change, energy, biodiversity, freshwater, oceans, land degradation, and forests.

The crosscutting theme in this report is the creation and impact of different kinds of partnerships and the approach each brings to strengthening sustainable development. To highlight the differences, these partnerships are presented separately, although this separation can be artificial. Creative programs bring together in one endeavor government aid, the private sector, NGOs, and the science and technology community. In partnerships, government aid is amplified, and large quantities of technological, human, and financial resources are brought to bear upon sustainable development. ■

Major Commitments to Study Global Climate Change

Half of the world's climate and global change research is financed by the U.S. Government. This amounts to $1.7 billion a year since FY 2000, through the U.S. Global Change Research Program, not including a five-year, $1 billion effort by USAID to help strengthen developing-country participation in the UN Framework Convention on Climate Change and to engage the private sector and other actors in climate change issues. This massive research effort assists sustainable development around the world in many ways. One example is advance warning of El Niño that allows farmers and fishermen in many tropical Pacific regions to quickly adapt to imminent climate change.



Good Domestic Governance

"Self-governing people prepared to participate in an open world marketplace are the very foundation of sustainable development, and that begins with good governance. Without a foundation of good governance, no amount of outside assistance will produce sustainable development."

Undersecretary of State
Paula J. Dobriansky
May 23, 2002

Why Good Domestic Governance Is Essential

Almost every aspect of sustainable development will be affected by the quality of civil society, political participation and decisionmaking, and responsible and reliable governance. Because good governance is the fundamental requirement for progress and sustainability, furthering it is at the core of U.S. strategy to foster sustainable development.

The goals of U.S. assistance programs that support good governance are

- democratic institutions that are effective, accountable, and transparent
- an independent and fair judiciary
- law enforcement that—with integrity—protects the people while strengthening their capacity to combat corruption
- sound monetary, fiscal, and trade policies that promote economic growth, social development, and environmental protection
- participation by all members of civil society in decisions that affect them

Democratic governance supports sustainable development by making institutions and policymaking more accountable, transparent, and responsive. Free and fair elections allow people to select and change their leaders and to express their preferences for political parties and popular movements. Increasing political participation allows citizens to influence the allocation of health services, food, clean water, and sanitation. A vibrant and politically active civil society, with a free press and the right to free association, will hold institutions accountable—the more so when policymaking is transparent and responsive to the concerns of citizens.

An independent and fair judiciary is also crucial. Solid judiciaries support laws that protect people, commerce, and the environment, and they enable enforceable contracts, a cornerstone of a functioning economy. Good governance also facilitates economic growth and equity. Both are shackled by corruption, a worldwide problem that distorts investment decisions, leads to misallocation of resources, and has a disproportionate impact on the poor.

The U.S. Government promotes good governance in every region of the world and believes that a good governance component makes environmentally oriented programs more effective. USAID is the lead agency in this work, providing $700 million annually to support an array of democracy and governance activities. It is worth noting that over half of the 400 sustainable development initiatives surveyed had a good governance and anticorruption component.

Initiatives for Good Domestic Governance

The United States has dedicated $19.5 million per year to the development of

international law enforcement academies. The Department of State, with the Departments of Justice and Treasury, will bring the expertise of their 12 law enforcement agencies to strengthen the capacity and integrity of the law enforcement profession throughout the world. The regional international Law Enforcement Academies in Thailand, Hungary, Botswana, and the United States provide training in environmental protection and criminal investigations, anti-corruption investigative task forces, and prosecutorial and judicial reform. A fifth academy is planned in Costa Rica. The National Center for State Courts, with USAID support, is strengthening judicial systems in more than 50 countries, including Brazil, Croatia, the Dominican Republic, Eritrea, Guatemala, Hungary, Mongolia, Nepal, Nigeria, and the Philippines. The National Strategy Information Center, with support from the Department of State, provides public education programming that aims to provide citizens and media with strategies to combat corruption and crime. The National Endowment for Democracy, with support from the U.S. Congress, promotes competitive elections and democratic systems throughout the world. The U.S. Government's support for reducing corruption is exemplified in the funding provided for Transpa-rency International, an agency that publicizes and works to reduce corrupt practices.

Governance issues are critical at local levels, where participatory problem solving permits effective resource stewardship. A population and child nutrition program in Morocco receiving $8.7 million from USAID promotes localized management of public health services in order to reduce bureaucracy and permit more direct assistance. This assistance will be more efficiently targeted through collaboration between public health officials, NGOs, community associations, and the private sector. USAID is also helping build related capabilities within Morocco's Ministry of Health.

The Ukraine Local Environmental Action Program, begun in 2000, has increased the effectiveness of policies at the local level, and empowered citizens to influence environmental decision-making. With USAID support, the program reached out to over 5,000 local communities, NGOs, and local businesses through eight newsletters entitled *Chysta Hata* (Clean Hut).

"As our Peruvian colleague Hernando de Soto has so aptly said, 'The hidden architecture of sustainable development is the law.' The law ... The rule of law that permits wonderful things to happen. The rule of law that permits people to be free and to pursue their God-given destiny, and to reach and to search and to try harder for their country, for their family. The rule of law that attracts investment. The rule of law that makes investment safe. The rule of law that will make sure there is no corruption, that will make sure there is justice in a nation that is trying to develop."

Secretary of State
Colin L. Powell
July 12, 2002

Local Rights and Participation in Indonesia

Reports of decentralized environmental decisionmaking and influential non-governmental constituencies come from Indonesia, where $12 million of USAID support promoted pluralistic and transparent decisionmaking and management. Key components in the process are site-specific natural resource management plans; agreements among local stakeholders; cooperation between resource user groups, local communities, private sector companies, and traditional groups; and the development of an integrated coastal management framework at a national level. In 2001, USAID assisted the implementation of 51 site-specific plans that placed 700,000 hectares of Indonesian forest and coastline under better management. This resulted from more than 180 Government of Indonesia policy decisions made in a participatory and transparent manner with local communities. Two site-specific examples follow:

- In North Sulawesi, community-based coastal zone management plans helped to more than double fish abundance in "no-take" protected areas, significantly increased fish diversity, and improved or stabilized more than 72 percent of coral reefs.
- In the Bird's Head Peninsula area of Papua, USAID helped to protect endangered sea turtles by working with communities to establish land tenure and to resolve conflicts over natural resource rights. As a result of village patrols and public awareness activities, the number of turtles nesting has increased by 50 percent since 1999.

"When development projects are infused with democratic principles and approaches, a cycle of benefits accrues. The projects not only achieve better results but also can change the way communities go about solving problems."

Linking Democracy and Development: An Idea for the Times, USAID June, 2001

These spotlighted local environmental projects in Ukraine and disseminated success stories from other countries in the region. The project helps 10 communities solve specific environmental problems and developed a team of Ukrainian professionals who provide local communities with needed technical support for environmental activities. As a result, NGOs and local authorities are being mobilized to undertake environmental cleanup and nature conservation activities across Ukraine.

The Value of an Integrated Approach

The U.S. Government is promoting an integrated, cross-sectoral approach to addressing governance and sustainable development. USAID efforts to assure clean water in El Salvador provide a good example. The project went well beyond protecting vital watersheds: it enhanced the governance of participating water municipalities by organizing and training small community groups, municipalities, and national water agencies. Activities that emphasized improved extension practices, watershed conservation, and production of high-value commodities contributed to substantial gains: 325 demonstration farms worked with 3,859 neighboring farms to increase the area of land conserved to almost 9,000 hectares—more than double the original end-of-activity target. Further, 50 potable water systems were completed, rehabilitated, or improved; these serve 50 percent of the households in 24 municipalities.

The cross-sectoral approach was also embraced for the creation of Regional Environmental Centers in Hungary, Ukraine, Moldova, Russia, Central Asia, and the Caucasus. The U.S. Environmental Protection Agency provided direct support to improve local environmental governance and public participation in Mariupol, Ukraine. The project instigated the first participatory approach to local planning and priority setting in Mariupol, and provided a lasting forum to allow NGOs, citizens, private businesses, and local authorities to cooperate on environmental problems.

Transboundary Water Issues in the Middle East

Around the world, solutions to environmental challenges require regional cooperation. Supporting the efforts of nations to work together on common environmental problems brings benefits beyond the scope of the particular issue. This point is exemplified by U.S. efforts concerning the river basins of the Nile and the Jordan, where the State Department is committed to a regional strategy that complements U.S. bilateral and multilateral diplomatic efforts.

Historically, the rest of the Middle East and North Africa envied Egypt and Sudan's access to the Nile's water, but today this great river struggles with increasing demands made upon it by population growth, economic development, droughts, and environmental degradation. As demand for water grows, so does the possibility of political and economic instability, especially if bordering countries unilaterally attempt to exploit water resources. With a host of other partners, the United States supports progress being made by the riparian states to address these issues, resolve regional water questions, and advance economic integration efforts.

Concomitantly, the Department of State is encouraging transboundary cooperation in order to promote better management of the water resources of the Jordan River and the Gulf of Aqaba. These efforts toward regional environmental cooperation exist within the context of the broader efforts to promote Middle East peace. To this end, the Department of State established one of its 12 worldwide Regional Environmental Hubs at the U.S. Embassy in Amman, Jordan. To promote, develop, and support regional water activities that arise from the Middle East peace process, the Amman Hub facilitates cooperation between regional mechanisms and institutions, and with national governments, environmental NGOs, donor organizations, and the business communities of the region. Many of these activities derive from the Multilateral Working Groups on Water Resources and the Working Group on the Environment. Participants include experts and officials from Jordan, Israel, the Palestinian Authority, Egypt, Tunisia, and Oman. They grapple with such topics as regional water data banks, public awareness and water conservation, electronic networking for water information, integrated pest management, watershed monitoring, dryland management, and desalination research and training.

Bringing nations together to find regional solutions to environmental challenges that transcend national boundaries can advance good governance practices in ways that go far beyond the scope of the environmental issues themselves.

Partnerships for Good Domestic Governance

The U.S. Government promotes good governance through a wide range of partnerships. Often, funding goes directly to governments that have demonstrated political will to strengthen and make more transparent their judicial and legislative bodies. In Armenia, for example, USAID provided nearly $2.2 million to improve the National Assembly's ability to communicate with its constituents and others and conduct financial and economic analyses.

The U.S. Government provides significant assistance to NGOs experienced in fostering civil society and democratic processes. For example, USAID supports PACT, a U.S. NGO, in its work with the Black Entrepreneurship and Enterprise Support program in South Africa, helping it to better advise small and micro-entrepreneurs on advocacy and participation in policy formulation.

Addressing Labor Issues

The U.S. Government recognizes that addressing employment and labor issues is essential to poverty alleviation and sustainable development, and that labor unions often play key roles in promoting civil society, fostering political participation, and demanding accountability from elected leaders. The U.S. Government therefore supports significant international programs to help achieve the healthy, educated workforce that is vital to a prospering economy and the protection of natural resources.

A program of the Department of Labor—Improving Economic Opportunities and Income Security for Workers—provided $50 million over the FY 2000–2002 period to strengthen the ability of developing countries to design and institutionalize the social

Ending Child Labor

Child labor is exceptionally pernicious. It deprives its victims of opportunities for education, and places them in working conditions that are often harsh and miserable. It destroys their innocence and their chances for a hopeful future as productive, successful adults.

Between FY 1995 and FY 2001, the U.S. Congress appropriated some $112 million to the Department of Labor for activities that combat international child labor through the International Labor Organization's International Program on the Elimination of Child Labor. These funds support a wide range of child-labor elimination projects and activities in Africa, Asia, Europe, the Middle East, Latin America, and the Caribbean, and contribute to the following objectives:

- Eliminating child labor in specific hazardous or abusive occupations. These targeted projects aim to remove children from exploitative work, provide them with educational opportunities, and generate alternative sources of income for their families.
- Bringing into the International Program on the Elimination of Child Labor more countries that are committed to addressing their child labor problems.
- Documenting the extent and nature of child labor.
- Raising public awareness and understanding of the international child labor problem.

In 2002, the U.S. Department of Labor will contribute an additional $45 million to support such projects, including an additional number of Timebound Programs—comprehensive, national initiatives that aim to end the worst forms of child labor in a particular country within five to 10 years. In addition, by September 2003, the Department's new Child Labor Education Initiative will award $74 million in grants to expand access to education in countries with a high incidence of exploitative child labor. This includes the $12 million recently awarded to organizations taking on the education of children removed from or at risk of entering child labor to supplement the department's funding in FY 2001 of the first three timebound programs in El Salvador, Nepal, and Tanzania.

safety net policies and programs needed to foster economic growth and worker protection.

Since 2000, the Labor Department has channeled some $60 million in assistance to help countries implement core labor standards in accordance with the UN International Labor Organization's Declaration on Fundamental Principles and Rights at Work. To promote the adoption and enforcement of these standards, the American Center for International Labor Solidarity receives $9 million a year from USAID. Other U.S. funding—over $500,000 since 1999—goes to the International Labor Rights Fund, an NGO that monitors labor practices in the apparel industry and manages two anti-sweatshop programs.

The United States is also extremely active in fighting child labor. It supports programs aimed at removing children from exploitative work, providing them with education and rehabilitation, and helping their families find viable economic alternatives.

Resolving Conflicts

Effective governance is required to prevent and control conflict. The United States has strengthened its organizational abilities to prevent the outbreak of conflicts and to end them as quickly as possible. The United States also tries to help countries quickly recover from conflict and resume a course of sustainable development.

In Afghanistan, the U.S. Government is reducing the potential for future conflict by strengthening government institutions that contribute to political differences being debated and settled peacefully. USAID participated in recent preparations to reestablish the *loya jirga*, the traditional Afghan forum for selecting political leadership. The U.S. Government is providing funding for programs that enhance the nascent government's credibility, strengthen law enforcement, secure borders, and enhance logistical and communication support for the Afghan Interim Authority; it is also funding local initiatives that help communities define priorities and rehabilitate local infrastructures, including village-to-market roads and government facilities.

A new tool in the effort to prevent and control conflict is a mechanism called Conflict Early Warning and Response Network, which was designed in cooperation with heads of seven countries in the Horn of Africa by USAID and GTZ (the aid agency of the Government of Germany). The Network was formally approved by the seven participating African governments in January 2002. It will promote peace and security through cooperation and dialogue with representatives of member state governments, civil society organizations, and bilateral and multilateral donors. ■

Investing in People

Human development is an essential objective of U.S.-assisted programs. Well educated, healthy people can take advantage of opportunities to build their economies and care for the environment. Investments in expanded and improved education are linked to faster and more equitable economic growth, increased productivity, reduced poverty, and strengthened democracy and civil liberties. Futhermore, citizens who are educated, trained, and healthy participate more fully in local, national, and global development.

Investing in Education

The U.S. Government provides field support, technical leadership, and research to help improve education and training in developing and transition countries. In over 25 countries, USAID gives priority to efforts that strengthen primary education, placing particular emphasis on improving educational access, quality, and equity. For FY 2002, the Agency's education budget was increased to $357 million, up from $285 million in FY 2001.

Other U.S. agencies, including the Small Business Administration and the Department of Education, spend $1–1.5 million annually on international education activities. USDA also expects to receive $100 million in FY 2003 for its Global Food for Education Program, which links improved nutrition and education.

In June 2002, President Bush announced that the United States is doubling—to $200 million—its five-year commitment to the African Education Initiative, launched in July 2001. The initiative, a collaboration with African governments, is designed to

- provide in-service training for more than 260,000 teachers
- train more than 160,000 new teachers
- partner with U.S.-historically black colleges and universities to provide 4.5 million more textbooks and other learning tools to African children
- provide 250,000 scholarships to African girls
- increase the role of parents in education and make schools more open to reform ideas from the community

Basic Education

U.S. Government resources and attention often give priority to basic education, which encompasses primary and secondary education, early childhood development, and literacy training for adults and out-of-school adolescents. The United States also provides training for teachers who work in any of these areas. The activities and objectives of the U.S. Government's overseas basic education initiatives include:

- creating student-friendly classrooms, and providing materials to meet growing demands
- sponsoring in-service teacher training, particularly for teachers in rural, isolated areas
- improving educational opportunities for girls, out-of-school youth, and other underserved populations
- providing educational opportunities to preschool-age children to improve their chances of primary school success
- restoring and improving the education of child victims of earthquakes, hurricanes, war, and the HIV/AIDS pandemic
- providing basic literacy and numeracy instruction in nonformal school settings
- using television, radio, and computers to improve instruction for hard-to-reach students and teachers

Other important projects that support basic education more indirectly involve students and teachers. These aim to

- involve communities in educational decisionmaking, program planning, and implementation
- facilitate dialogue on education policy reform to improve system efficiency and quality
- strengthen planning, management, and evaluation expertise within agencies and institutions
- evaluate private sector initiatives and establish partnerships between public and private institutions
- initiate efforts to minimize abusive child labor through education

The Peace Corps implements basic education projects in 52 countries. Thirty-five percent of its volunteers are engaged in education, the largest single sector of involvement. Most of them teach English, mathematics, or science; others train teachers or their counterparts. Education volunteers also work with communities to expand resources, develop youth camps, design curricula, and become familiar with computer technology.

Information and communication technologies offer outstanding opportunities to provide education. To this purpose, the U.S. Government helps to incorporate them into educational systems and to establish the legal and regulatory frameworks required for the proliferation of such services. In rural and disadvantaged areas, the U.S. Government establishes telecenters that are alternative delivery systems for basic education. USAID supports *Educatrodos,* run by the Ministry of Education in Honduras, a program that educates youth and young adults by means of interactive radio lessons keyed to accompanying texts. A similar program in Zambia instructs orphans and other vulnerable children. It is the product of collaboration between USAID contractors, the Ministry of Education, the Ministry's Education Broadcasting Service, NGOs, church groups, and communities. USAID also launched the Training Uganda's Teachers with Technology Project. In close cooperation with Uganda's Ministry of Education, this project equipped nine educational centers with computer training laboratories

and is preparing a multimedia, online teacher-training curriculum.

Workforce Training, Higher Education, and Fellowships

Cooperative programs and projects sponsored by a variety of U.S. agencies provide both direct and indirect capacity building to bolster sustainable development. The U.S. Department of Health and Human Services (HHS) Health Resources and Services Administration has aided in the establishment of telehealth networks to train providers in remote areas of U.S. territories and associated jurisdictions in the Pacific. This technology platform allows states in the Pacific to develop the infrastructure necessary to establish the telehealth system as a key strategy for improving primary care delivery, enhancing prevention activities, and supporting the training of health personnel.

USAID's Education for Development and Democracy Initiative aims to improve education and strengthen access to the technology and information needed to compete in the twenty-first century. One activity of the initiative is a partnership with Georgia State University to establish the Ronald H. Brown Institute in memory of the late U.S. Secretary of Commerce. The Institute is designed to contribute to private-sector-led economic growth in Africa by strengthening the skills of people already in business and providing training to other individuals, especially students, aspiring to enter the business world. The focus will be on state-of-the-art technologies, marketing techniques, and management systems to raise productivity, efficiency, and standards of quality control to help companies achieve and maintain international competitiveness.

Among a variety of U.S.-supported international workforce development and training initiatives is one run by the U.S Department of Education that trains educators from Eastern and Central Europe in civics education, human and financial resource management, and education policy reform. Another run by the U.S. Small Business Administration provides training and advice to Egyptian business owners. In addition, the U.S. Department of Health and Human Services, through its agencies, the National Institutes of Health, the Centers for Disease Control and Prevention, and the Health Resources and Services Administration, promotes human capacity development in areas such as health research, provision of health and medical services, and health system organizational capacity.

Sustainable societies require a critical mass of highly trained people, including experts in scientific discovery and the management of data and information systems.

To this end, the U.S. Government supports capacity building programs that offer a wide variety of education, training, and information resources, and fosters public–private partnerships between academic institutions. The Higher Education and Workforce Development Partnership Program has created partnerships in 53 countries among 130 U.S. community colleges and universities and 120 institutions in developing countries. This Program developed or upgraded university curricula in HIV/AIDS (India, South Africa), human rights (Colombia), community health (Senegal), agronomy and agricultural extension (Rwanda), environmental engineering (Philippines), child welfare and nutrition (India),

pesticide disposal (Tanzania), teacher training (South Africa, Ghana), solid waste and wastewater management (Uganda), and mathematics and science (South Africa).

A large number of fellowships and exchanges for specialists working on sustainable development issues are supported by the U.S. Government and by U.S. foundations and universities. Such institutional awards strengthen home country capability and bolster the training conducted by U.S. faculty in home country institutions.

Promoting Health and Combating Disease

The U.S. Government also supports initiatives that strengthen laboratory capabilities, and training in areas like epidemiology and health services delivery. USAID and HHS's National Institutes of Health, Centers for Disease Control and Prevention, and the Health Resources and Services Administration have made substantial commitments. The National Institutes of Health alone manages more than 20 different international programs to build research capacity.

Numerous cooperative international programs and projects sponsored by many U.S. federal agencies and non-profit groups build capacity and bolster sustainable development. Programs that provide training in epidemiology, collaboration on education and advocacy programs, and the strengthening of laboratory capabilities are supported by USAID and HHS through several insitutes and centers at the National Institutes of Health and the Centers for Disease Control and Prevention.

U.S. Government efforts to promote sustainable development concentrate on

- improving maternal and child survival, health and nutrition
- contributing to the advancement of scientific knowledge about health and helping to transfer this knowledge to developing countries
- preventing HIV/AIDS and mitigating its impact
- preventing disease and reducing deaths from other major infectious diseases

Maternal and Child Survival

Since the 1960s, the U.S. Government has been a global leader in the worldwide effort to improve maternal and child health. It has supported the development of tools—such as vaccines and oral rehydration therapy—used to lower mortality rates for children under age 5. Between 1985 and 2000, these rates dropped from 105 to 70 per 1000 (excluding China). Current contributions include

- HHS/CDC and USAID efforts to eliminate or eradicate measles, and U.S.-supported family planning programs that reduce maternal and child deaths in poor families.
- Supplemental vitamin A programs that USAID helped establish in more than 50 countries in an effort to reduce the mortality rate for children under 5 by 23 to 34 percent.
- USAID's development food aid program in 38 countries that helps to reduce child malnutrition and mortality. In India, CARE's program reaches 8 million women and children. The program also promotes sustainable solutions to poverty and hunger.

Preventing and Controlling HIV/AIDS

Historically, the U.S. Government has been the largest bilateral donor helping to prevent and control HIV/AIDS, and

it has substantially increased its commitments since 2000. Many departments and agencies lend their expertise and resources. A partnership formed by the Departments of State, Defense, Labor, Health and Human Services, and USAID provides financial and human resources to the international effort to combat the pandemic, and is active in 24 of the most vulnerable countries. The work includes establishing and promoting voluntary counseling and testing programs, workplace education, surveillance that tracks HIV seroprevalence, and communication to change behaviors that contribute to HIV infection.

Many agencies lend their expertise and resources to the campaign, including several within the Department of Health and Human Services. During the past 15 years, the International AIDS Research and Training Program of the National Institutes of Health has trained over 2,000 scientists from over 100 countries. The HHS Centers for Disease Control and Prevention (CDC), active in 24 countries, expands and strengthens surveillance programs for HIV/AIDS and sexually transmitted diseases, and strengthens laboratory support for their diagnosis and for blood safety screening. Among the countries included in the initiative, Zambia reduced HIV prevalence among 15- to 19-year olds by 42 percent between1993 and 1998. Contributing to this result was a USAID-supported mass media campaign aimed at young adults and a CDC public health program.

The International Training and Education Center for HIV works to improve the care of people living with HIV/AIDS in heavily affected countries, and especially in sub-Saharan Africa and India. Established by the HHS Health Resources and Services Administration and the HHS/CDC, the center is increasing the capacity for the training of HIV/AIDS care providers—physicians, nurses, clinical administrators, and other key personnel. The center enhances training capacities in diagnosis, treatment, and prevention of the HIV virus, including the prevention of perinatal transmission and the prevention and treatment of opportunistic infections, including tuberculosis.

Breakthrough Innovations on HIV/AIDS in Uganda

In the fight against HIV/AIDS, the example of Uganda is instructive. Between 1992 and 2000, strong political leadership by the country's president and innovative and rigorous approaches to HIV prevention and care contributed to reducing the country's HIV-prevalence rate by over 50 percent—down to an estimated 8.3 percent of the adult population. The president's political leadership encouraged broad and frank discussions. Radio, television, churches, mosques, media, schools, and political institutions disseminated information. Women were also encouraged to be more assertive in promoting safe sex.

USAID, the HHS Centers for Disease Control and Prevention, and the Department of Defense played important roles in this success. They supported such innovative projects as:

- the AIDS Information Center, the first program in Africa to offer voluntary counseling and testing for HIV, now expanded to 51 locations
- TASO—The AIDS Support Organization—the first and largest indigenous HIV/AIDS care and support organization in Africa
- an innovative "model district" program that is developing comprehensive, integrated HIV/AIDS services in 10 districts throughout Uganda
- the first AIDS in the Workplace project in Africa, and one of the first AIDS in the Military projects
- an activity that used U.S. Department of Agriculture emergency humanitarian food aid to help meet the nutritional needs of families and orphans affected by the HIV/AIDS epidemic

The Department of Labor's Workplace Education Program also aims to reduce the rate of HIV/AIDS infections in Malawi, Nigeria, Zimbabwe, Ukraine, Vietnam, the Dominican Republic, India, and Haiti, by working with employers, trade unions, and government ministries.

In June 2002, President Bush announced an International Mother and Child HIV Prevention Initiative. It will spend $500 million to prevent the transmission of HIV/AIDS from mothers to infants and improve healthcare delivery in the Caribbean and 12 African countries. The improved drug treatment and healthcare provided by this new initiative stand to reach up to 1 million women annually, and are expected to reduce the incidence of mother-to-child transmission by 40 percent within five years.

The United States provided initial funds and pledged $500 million to the Global Fund to Fight AIDS, Tuberculosis, and Malaria, and is committed to increase the contribution as the fund shows results. The grants and drugs thus provided should enable a six-fold increase in anti-retroviral treatment for HIV in Africa.

The largest investment in AIDS research belongs to the HHS National Institutes of Health, which will invest $2.5 billion in FY 2002. These unparalleled expenditures concentrate on such key areas as the development of vaccines and microbicides: biomedical and behavioral prevention strategies, including prevention of mother-to-child transmission; and care and treatment approaches, including antiretroviral therapies and treatment and prevention of coinfections. The HHS/NIH Plan for HIV-Related Research includes a strategic plan for international AIDS research, including training of researchers, enhancing laboratory capacity, developing clinical capability, and transferring sustainable technologies such as low-cost diagnostics. An important HHS/NIH focus is the translation of the results of research to improve patient care, develop prevention programs, and inform policy decisions in resource-poor settings around the world.

Fighting Other Endemic Diseases

U.S. Government programs also contribute to reducing deaths and sickness from other endemic infectious diseases. Malaria requires particular attention; it causes an estimated 1 million deaths annually, as well as another 1.8 million malaria-related deaths. USAID supports efforts to develop a malaria vaccine and sponsors innovative, low-cost health care technologies for use in developing countries. These include a rapid diagnostic strip test—an easy-to-use and low-cost test for malaria—and syringes that self-destruct after one use to prevent reuse and transmission of blood-borne diseases. U.S.-supported malaria programs work to improve prevention and treatment, increase local capacity to combat the disease, and accelerate vaccine development. Among them is the Fogarty International Center of the HHS National Institutes of Health, which funds the International Malaria Research Training Program. Health professionals from Kenya, Mali, Senegal, Uganda, and Zimbabwe have trained in malaria research under its auspices.

In 2000, tuberculosis caused an estimated 1.7 million deaths worldwide. To help control this epidemic, USAID

recently funded the Tuberculosis Coalition for Technical Assistance. It comprises six partners with great expertise in tuberculosis prevention and control, including the American Lung Association and the Royal Netherlands Tuberculosis Association. They will provide technical assistance to developing country governments and organizations. To fight tuberculosis, USAID also assists programs in 31 countries. The Agency collaborated with the Gorgas Memorial Institute to adapt the Directly Observed Therapy Shortcourse approach for tuberculosis victims in Brazil. The trial program in a rural area near Rio de Janeiro achieved an 84 percent treatment success rate, considerably higher than usual.

With the Bill and Melinda Gates Foundation, the U.S. Government is a key partner in the Global Alliance for Vaccines and Immunization, which seeks to reduce the disparities in immunization access in 60 developing countries where the need is greatest. For this purpose, the Alliance has made five-year commitments that total over $900 million to make available vaccines against yellow fever, hepatitis B, and haemophilus influenza B, a leading cause of meningitis and other diseases. Mozambique received 1.3 million doses of a combined vaccine and funding to strengthen immunization services from the Alliance in 2001. Such efforts to fight and prevent devastating diseases combine the energies, capabilities, and inventiveness of the public and the private sectors, involving NGOs, foundations, and academia.

For nearly 20 years, the HHS Centers for Disease Control and Prevention have collaborated with ministries of health and universities around the world to establish and conduct Applied Epidemiology Training Programs for developing local specialists in epidemiology. These programs are modeled on the Epidemic Intelligence Service, the centers' premier applied epidemiology training program. The two-year training and service programs are designed for health professionals in entry or mid-level positions. Approximately 95 percent of all graduates remain in government service as public health practitioners at local, district, provincial, and national levels. Trainees have conducted investigations that encompass virtually every known area of public health, including vaccine-preventable diseases, diarrheal diseases, malaria, HIV, Ebola, occupational and environmental health issues, and noncommunicable diseases.

The Asia Pacific Economic Cooperation strategy against infectious disease, led and supported by the United States, includes a Network-of-Networks initiative. This initiative will help to improve disease surveillance and monitoring in the region, boost national capacity to respond to outbreaks, and train health authorities. ■

Mobilizing Partnerships for Sustainable Development

"At Johannesburg, governments will agree on a common plan of action. But the most creative agents of change may well be partnerships—among governments, private businesses, nonprofit organizations, scholars, and concerned citizens."

UN Secretary General
Kofi Annan
May 14, 2002

Why Partnerships Are Effective

Support by the U.S. Government for partnerships has been both extensive and balanced. To reach the goals of sustainable development, the U.S. has supported different kinds of partnerships. Those between governments achieve common goals and contribute to capacities to rule fairly and productively. Partnerships between governments and the private sector, foundations, NGOs, the scientific and technology communities, and labor organizations bring a wide range of talents and resources to bear on the critical tasks of resource stewardship, economic progress, and social development.

Partnering with the Nonprofit Sector

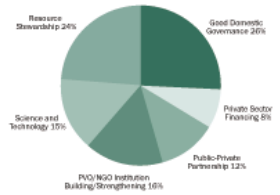
Domestic NGOs and international private voluntary organizations (PVOs) play vital roles in sustainable development. Frequently, they work to increase the skills and assets of poor people, and they advance the causes of environmental stewardship, human rights, and good governance. The U.S. Government has long recognized the contributions of PVOs and NGOs and has funded a variety of programs that build their capacities and support their work.

With USAID assistance

- PVOs work with poor rural communities to improve incomes and welfare in almost all countries in Africa
- NGOs, including faith-based organizations, play key roles in responding to the AIDS epidemic in Africa and elsewhere
- NGOs involve parents and community groups in support of schooling
- NGOs and PVOs carry out significant environmental tasks, including safeguarding watersheds, providing pure water, maintaining biodiversity, and ensuring sustainable forest use

Over the past 40 years, progress in international development has become increasingly dependent on the nonprofit sector, which brings significant resources to the task. U.S. PVOs alone provide an estimated $4 billion annually in assistance grants—or about 60 percent of all such flows. In 2000, U.S.

Initiatives by Theme



PVOs implemented an additional $2.7 billion annually to programs financed by the U.S. Government.

Promoting Good Governance

PVOs and NGOs committed to participatory development and sound development practices are often strengthened by U.S.-funded technical and organizational management training assistance and by USAID funding to develop consortia and umbrella organizations. Of the initiatives surveyed, 20 percent supported PVOs or NGOs, either as a primary focus or an activity component. One such recipient is the Democracy Network Program in Macedonia. Since its inception, the DemNet Program has enhanced democratic institutions and promoted citizen participation by strengthening civil society organizations through training, technical assistance, and grant support. Six environmental NGOs number among the various partners of this program.

USAID also supports NGOs that strive to improve conditions of work. Funding provided to the American Center for International Labor Solidarity helps bring technical assistance to unions, labor NGOs, and others, enabling them to promote the adoption and effective enforcement of core labor standards and the crusade against child labor. The Center also helps establish legal frameworks to protect and promote civil society, increases the institutional and financial viability of labor unions and labor NGOs, supports anti-sweatshop activities, and improves health through workplace and peer-to-peer health education and prevention.

The USAID-supported Women's Economic and Legal Rights program trained women market vendors in Cambodia to deal more effectively with market authorities, and provided legal aid on work-related issues that has helped women in Bangladesh form trade unions and prompted government responses to worker's complaints.

Promoting Economic Growth

U.S.-supported PVOs and NGOs promote economic growth in a number of sectors. Among many examples, USAID supports efforts of herder groups in Mongolia to increase their incomes and funds business development services and business-focused civil society organizations in Ecuador. USAID also funds business skills training for microfinance institutions in Zimbabwe. Assisted by USAID, Technoserve, a U.S. NGO, established business organizations that support small farmers in El Salvador and many other countries.

"Good policies are not enough. People must be able to seize the opportunity .... Governments, civil society, and the private sector must work in partnership to mobilize development resources. We must work together to unleash human productivity, to reduce poverty, to promote healthy environments and foster ... sustainable growth. We've got to help young people to get the skills they need, the education they need, the motivation they need to take part in a changing economy and a changing political environment."

Secretary of State
Colin L. Powell
July 12, 2002

Caspian Partnership Program

The Caspian Environmental Partnership Program builds and strengthens a network of NGO partners that addresses environmental and social issues. Initially funded by USAID, the program now receives support from the Open Society Institute, the Trust for Mutual Understanding, and Rockefeller Family Associates. Its objectives are to:

- build a network of informed activists to share information and plans in Caspian-related activities
- increase effectiveness of NGOs at the local level
- increase partnership among NGOs working on environmental issues relevant to the Caspian region
- strengthen inter-sectoral cooperation among NGOs, business, and government

The Caspian Cooperative Grants Program funds programs in such areas as environmental education, monitoring of pollution impacts, and promotion of safe transit of oil by Kazakh and Russian NGOs. The Program also includes the Caspinfo Newsletter and website, and the Caspian Seminar Series. Its Caspian E-mail Grants Program provides e-mail access to environmental NGOs in the region and in remote areas, assisting communication between them, and providing e-mail training to over 40 environmental NGO representatives in four countries.

The Food for Peace Program, supported by USAID and the Department of Agriculture, provides significant resources to PVOs seeking to increase agricultural production. The program also provides strengthening support to cooperating agencies such as Food Assistance Management, a consortium of PVOs offering a forum for sharing information and technical training for its members.

Peace Corps volunteers also support economic development through NGOs. In Panama, they work with numerous small business associations, while in Bolivia they build capacity in NGO artisan associations. The Peace Corps Community Economic Development Project in Romania places volunteers in NGOs, chambers of commerce, public administration offices, and schools and universities.

Promoting Social Development

Much is being done at the country level to strengthen NGOs working in health. In Bangladesh, USAID provides technical assistance to expand and improve the package of health services available from NGOs, including assistance relating to behavior change communications. The members of an NGO health consortium in Bolivia that USAID helped to establish provide health services to lower income citizens. In Yemen, part of a larger health and education program will mobilize and train community women's organizations to address women's health issues and mobilize and strengthen community participation and parental involvement in basic education.

Funding provided to TASO, the Ugandan AIDS Support Organization, enabled it to support other NGO programs in 21 Ugandan districts. USAID provides support for the International HIV/AIDS Alliance, which not only builds the capacity of local NGOs and community-based organizations in every region of the developing world, but also documents and shares lessons about mobilization and capacity building. USAID also supports NGO Networks for Health, a consortium of five PVOs led by Save the Children, that builds and strengthens the capacities of PVO/NGO networks to deliver family planning, maternal health and child survival programs, and HIV/AIDS prevention services.

In education, USAID helps to involve parents and community groups in schooling through support for parent-teacher associations, school committees, and development teams. The Agency also supports community schools that are either established by local residents with support from the government or established by a local NGO and managed by community members. In such schools, parents improve facilities, establish needed programs, monitor teacher performance, and sustain community interest in education.

USAID agreed to support 70 new schools in rural areas of Egypt where gender imbalances were greatest. Individuals, villages, and the government donated the land. Community education teams took responsibility for identifying sites, securing deeds, obtaining the necessary permits, and helping coordinate school construction. These volunteer teams were also responsible for helping enroll girls and making local school management decisions. In one year, 10,600 children were enrolled in primary grades.

In an effort to rehabilitate and advance basic education, USAID/Ethiopia has been working to increase community participation in schools. Under the Community Schools Grants Program, 1,300 schools received grants that were matched by local contributions. These funds permit community groups to be involved in day-to-day management decisions to improve school facilities and create girl-friendly school environments. Primary school enrollment rates have more than doubled, and girls' participation has dramatically increased in targeted schools.

Some NGO/PVO strengthening activities simultaneously support economic growth, social progress, and resource stewardship. Among these are agricultural development projects that increase production and reduce use of expensive and environmentally damaging fertilizers and pesticides. Another example is a USAID initiative in the Democratic Republic of the Congo that works, with broad NGO and PVO involvement and emphasis on civil society participation, to improve food security and health and to protect biodiversity.

Promoting Environmental Stewardship

Often with the assistance of U.S. Government agencies, NGOs play important roles in resource stewardship. They help to mobilize the interest of local people in conservation, promote equitable access and good governance, and encourage alternatives to resource exploitation.

The Environmental Protection Agency's International Safe Drinking Water Initiative, launched in 1999, is making efforts to build capacities of local water professionals and communities to improve drinking water quality in Central America and eastern and southern Africa. In response to the devastation caused by Hurricane Mitch in Central America, the agency joined forces with USAID and other U.S. Government agencies to aid the reconstruction of the region. The agency addressed improvements to drinking water quality by helping to protect source water and develop safe drinking water programs. Through a series of train-the-trainer workshops, technical assistance, and hands-on practical experience, NGOs, community members, and water professionals learned how to analyze water quality data and use them in the decisionmaking process. These strategies have been applied in Africa, where the agency addresses the water and sanitation needs of the urban

Natural Resource Management in Namibia

In Namibia, USAID is supporting a community-based natural resource management program that is establishing, managing, and sustaining conservancies. One component of this support is technical assistance and training to NGOs, conservancies, and the Ministry of Environment and Tourism. Since 1996, the government has registered 15 communal area conservancies that engage over 32,000 historically disadvantaged Namibians and encompass 4 million hectares of prime wildlife habitat. Income earned by these conservancies—primarily through tourism—has doubled since 2001 and is 230 percent over targets set in 1999. One conservancy is financially self-sufficient and three others should be within the next 12 months. Employment has also increased: over 500 full- and part-time skilled jobs were created, an estimated 300 people received income from the production and sale of handicrafts, and over 700 people took advantage of seasonal, unskilled employment opportunities.

poor, in partnership with Water for People, a U.S.-based NGO.

In Jamaica, USAID's program to improve the quality of key natural resources provides a small grants program to local NGOs to implement community-based environmental projects in the Great River watershed. These involve such areas as water and sanitation, disease resistant crops, biological soil conservation, and waste management.

USAID is also financing the construction of a water supply network for 23 villages in the southern West Bank that will result in potable water being available for the first time in these villages. Village councils are involved in decisions on how to pay for and maintain the distribution system.

In Mexico, the Department of Agriculture's Forest Service is helping NGOs conduct watershed assessments and design restoration programs in order to improve the health, functioning, and products of watersheds serving critical natural and urban areas. In the State of Guanajuato, Forest Service experts helped assess the Rio Laja watershed and train communities to undertake restoration activities in streambeds. In Queretaro, the Forest Service is supporting efforts of a local group to conduct an inventory of forest and river ecosystems in the Sierra Gorda as a first step toward improving their management.

NGOs and PVOs play key roles in sustainable development. The U.S. Government has helped make this impact even greater through its many programs to strengthen NGOs and PVOs and support their efforts.

How Private Investments Support Sustainable Development

In the last few decades, the role of private investment in developing and transition countries has overshadowed official development assistance in terms of resource flows. In the 1960s, official development assistance accounted for over 70 percent of total U.S. resource transfers, while in the 1990s, private flows accounted for nearly 80 percent of total U.S. transfers. Overall, developing countries earn $2.4 trillion per year from trade and receive $180–200 billion a year in foreign investment (in addition to a very large amount of domestic private investment). This compares to total foreign aid of about $55 billion per year.

Helping countries engage the private sector for development and growth is an integral part of U.S. efforts to assist developing and transition countries. The United States works with national governments to develop policies that encourage the private sector and laws that protect business owners and investors. More directly, the United States works with business associations, businesses, and individual entrepreneurs to prepare them for many of the tasks of sustainable economies. This includes helping develop financial services for micro and small enterprises to assist in developing new generations of entrepreneurs. Training and technical assistance is also provided to business people to increase efficiency, productivity, and competitiveness.

The U.S. Government forms partnerships with multilateral and bilateral donors as well as with the private sector to plan and implement these initiatives. An important aspect of the initia-

tives is partnering between private sector organizations to foster the transfer of knowledge and resources.

Private sector financing contributes to all three pillars of sustainable development: social progress, economic growth, and management of natural resources. Social progress is enhanced through a vibrant private sector that provides choices to individuals for their employment and opportunities for training and education.

Worldwide, the private sector has been the most efficient avenue for economic growth, as competition promotes efficiency and ingenuity. The private sector also encourages sustainable natural resource management as companies pursue ways to increase their profits by using fewer resources such as energy, water, soil, and land.

Private Sector Finance and Good Governance

Countries throughout Eastern Europe and Asia are in the midst of a transition from centrally planned to market economies. In Mongolia, USAID provides technical assistance and training in the privatization and commercialization of publicly-owned companies. A USAID-funded management contract introduced sound commercial practices and brought about a dramatic turnaround in Mongolia's Agricultural Bank. Eighteen months of management and employee training helped render the bank solvent and saved its vital network of 356 rural branch offices.

The bank is now slated for privatization. Since 1998, USAID-funded advisors have been instrumental in the sale of 47 government-owned enterprises through a sealed bid auction that has raised more than $15.4 million for Mongolia.

One of the most important engines of growth is markets that can expand through fairly run trade regimes. However, a significant barrier to efficient trade in Southeastern Europe is at the border of each country in the customs house. Corruption, inconsistently enforced regulations, and poor customer service mentality often impede the flow of goods. The result is that customs procedures often account for a significant portion of the total costs of moving goods through the region. To address this problem, USAID has developed an innovative partnershipunder the Trade and Transport Facilitation in Southeast Europe Program. The program aims to increase the volume and value of trade in

"The evidence is that where nations adopt sound policies, a dollar of foreign aid attracts two dollars of private investment."

President George W. Bush
March 14, 2002

Domestic Shelter and Municipal Services for the Poor in South Africa

To bring together stakeholders that provide shelter and municipal services to the poor, the U.S. has used grant funds to provide technical assistance, training, and grants to NGOs, combined with credit guaranties. In South Africa, these guarantees have supported private financial institutions efforts to better serve lower- and middle-income populations as well as increase private investment in critical municipal services such as water, sanitation, and electricity, particularly among the country's historically disadvantaged populations.

These efforts have yielded significant results. Since 1994, $15 million in grant funds have guaranteed nearly $230 million in lending from private partners for shelter and municipal water and sanitation services. In exchange for access to these funds, the domestic private sector in South Africa has lent over $700 million to individual households for shelter and to local authorities for critical municipal services. An estimated 1.2 million households benefited from these services. A survey of beneficiaries under one program found that over one-third were female heads of household.

southeast Europe by improving customs infrastructure and efficiency and increasing the capacity of second-tier transporters to move goods throughout the region. The World Bank has approved $64 million in loans to Romania, Bulgaria, Moldova, Macedonia, Albania, Croatia, and Bosnia and Herzegovina to improve the physical infrastructure of customs stations. USAID, working with U.S. Customs, will improve the technical capacity and efficiency of customs agencies by streamlining operations and reducing paperwork. A grant to the American College of Thessaloniki is funding development of a distance-learning program for second-tier freight forwarders to increase their knowledge of customs procedures and develop a standardized code of ethics and operations.

In Croatia, USAID is assisting in the long process of creating a full-service private sector. The Government of Croatia's portfolio of state-owned enterprises has been reduced from approximately 1,900 at the outset of USAID assistance to the present level of around 1,200. Croatia is now beginning to modernize, restructure, and privatize its energy sector. USAID advisors assisted the Ministry of the Economy and the Energy Institute in the drafting of five laws that provide the legal framework for this process. Additionally, with the support of the USAID-funded Croatian Competitiveness Initiative, the chief executive officers of 14 of the largest businesses in Croatia have formed a business roundtable that meets regularly. They are developing long-term strategic plans to increase Croatian competitiveness in cooperation with key government officials, national labor leaders, and universities.

How Private Sector Finance Increases Incomes and Opportunities

In a number of countries, the United States is fostering the creation of enterprises, focusing both on the general economy and on creating opportunities for the poor to increase their incomes. Jordan has taken a wide range of measures to open markets, overcome structural economic obstacles, and integrate more fully into the global economy. For example, the Aqaba Special Economic Zone is a model of streamlined investment procedures. USAID played a critical role in providing advisory services for this initiative and will continue to provide assistance until the zone is fully established and efforts are made to expand trade and attract new investment. Already, the zone has attracted $422 million in private investment, far exceeding the target of $100 million. USAID also initiated the construction of a light industrial estate in Aqaba, which is anticipated to generate over 5,000 new light industrial jobs within five years.

In India, USAID's economic growth program focuses on improving the regulatory environment for the private sector. USAID is working with India's Securities and Exchange Board, the Insurance Regulatory and Development Authority, and the Ministry of Finance Pension Reform Task Force to strengthen capital market regulation and oversight. One activity is developing regulatory and performance standards for microfinance institutions and promoting linkages between the microfinance subsector and the mainstream financial sector.

Businesses need financial backing, but micro and small businesses often do

not have access to the services of commercial banks. Banks are often not well structured to cater to the micro and small-scale market, and their costs are often too high to make microlending profitable. Through programs in a large number of countries, the U.S. Government promotes the growth of micro and small businesses by strengthening institutions servicing microenterprises. In follow-up to the NGO-led Microcredit Summit, the United States has strengthened its programs to foster microenterprises. Annual appropriations now total $155 million a year, of which half must be expended in programs aimed at the poorest.

In 1999, USAID's Microenterprise Initiative reached 4.5 million poor clients—2.5 million in Indonesia alone—with active loans from USAID-supported institutions. The loans totaled $1.5 billion. Of the 2 million clients outside of Indonesia, 69 percent were below the line designated by the U.S. Congress for poverty lending. Worldwide, 70 percent of microfinance clients are women, and loan repayment rates average 95 percent. Current plans for USAID microfinance activities emphasize expanding the number of sustainable intermediaries assisted, expanding their client base to include more and poorer clients, and broadening the range of services to include insurance, savings, and transfers. USAID is also expanding its business development services, such as technical and management skills training, marketing services, and productivity-enhancing technology. Priority interventions will strengthen private sector vendors of business development services to better serve the needs of urban and rural microenterprises.

Supported by USAID's leadership, the microenterprise field is continuing to receive substantial attention from donors, international organizations, and NGOs. The Consultative Group to Assist the Poorest (CGAP), a multi-donor effort founded by USAID, now numbers 27 donors and has established a strong program of global microenterprise development. USAID is now spearheading the creation of a CGAP working group on market research and product development and is establishing donor coordination through CGAP to strengthen African programs. USAID also played a leadership role in promoting market-driven business development services for microenterprises, coordinating this work through the Donors' Committee on Small Enterprise Development.

In Senegal, USAID provides institutional support, technical training, and equipment to seven microfinance institutions that have networks totaling 95 individual bank branches. The support has helped the microfinance institutions open new branches in unserved areas, expand and strengthen their existing branches, increase client confidence, and increase their outreach. As a result, the number of clients, volume of savings, and value of loans have increased sharply.

As noted above, entrepreneurs often need training in how to manage a competitive business. One local-level provider of such training is the Peace Corps. In 2001, the Peace Corps reported business development projects in 36 countries benefiting about 2,400 communities. In the process it trained 6,700 service providers and strengthened 3,700 groups.

USAID is partnering with the Organization of Eastern Caribbean States to help companies in the eastern Caribbean strengthen their ability to compete in the international marketplace. Technical assistance and training is provided to targeted small and medium-sized companies in areas such as product and quality assurance, computerization, productivity tooling, marketing information and research, and gaining access to new markets. Efforts are also underway to help educational institutions build human capacity in areas such as information technology and business management.

The U.S. Small Business Administration is providing technical assistance to Nigeria to create two business information centers to promote private sector enterprise and small business development through public–private partnerships. The centers serve as one-stop community-based business assistance centers where small- and medium-scale entrepreneurs can receive technical assistance, gain computer access, explore financial options, and link up with other businesses. The project also provides center managers with U.S.-based and in-country training.

Increased Environmental Management Capacity to Support Sustainable Economic Growth in Russia

The forests of the Russian far east and Siberia contain immense potential for jobs, and for business opportunities in secondary wood processing, non-timber forest products, and ecotourism. To help Russia establish sustainable economic growth, USAID initiated improved environmental management activities in 2000, which, upon completion in 2005, will have cost approximately $30 million.

USAID support has helped about 150 ecobusinesses in the Russian far east to grow and improve their environmental performance. New tourism facilities in protected areas have meant increasing opportunities for tourism and new businesses and jobs for local residents, who now have more stake in preserving the environment. Reforested acreage has increased in one major forest region, due to USAID assistance in forest management for forestry administration and small businesses.

For economic reasons, businesses are also taking environmental issues more seriously. USAID's grantees have been helping Russian businesses become more profitable by improving their energy efficiency and reducing pollution from their operations. USAID is helping Russian businesses comply with the World Trade Organization's required international environmental standards for companies competing in the global market. More than 100 businesses are now pursuing certification. USAID support is also helping to widen investment opportunities and expand markets in secondary wood processing, non-timber forest products, and ecotourism.

How Private Sector Finance Promotes Environmental Stewardship

The private sector can help manage and conserve natural resources and the environment by using environmentally sound production methods. Production that limits pollution, and conserves water, soil, land, and fuel, protects natural resources for the future. Conservation techniques may also increase current food yields by, for example, conserving rich soils and replenishing depleted soil. An informative case on how this works in forestry is found in Russia where, with USAID assistance, forestry sustainability and the private sector are finding common purpose.

The Nicaraguan agricultural sector, slowly recovering from Hurricane Mitch, has recently suffered further setbacks from a series of droughts and a decline in international coffee prices. USAID has formed partnerships with U.S. and Nicaraguan NGOs to help small farmers adopt environmentally sustainable agricultural practices and use improved and certified seeds. Crop diversification, improved soil and water conservation, environmentally sound cultivation practices, and improved

post-harvest storage can increase incomes for farmers while protecting the environment. These methods are improving the resilience of agricultural producers, teaching them how to best identify, use, and conserve their productive resources.

Public–Private Partnerships

The U.S. Government recognizes that sustainable development can be enhanced when public institutions collaborate with private for-profit and nonprofit institutions and organizations. Such partnerships can greatly extend the impact of public programs with limited operating budgets and trained staff. Local private entities can engage local groups in solving their own problems and can offer feedback that enhances the effectiveness of public agencies. On an international level, U.S. private sector entities—PVOs, professional societies, academic institutions, firms, and enterprises—can share ideas, technologies, financial resources, and management approaches with developing-country governments and local NGOs.

These partnerships reflect a spectrum of arrangements. The following hold the most promise for fostering sustainable development:

- networks of public and private organizations address global and regional goals, such as improved health and education, increased food production, and better stewardship of natural resources
- bilateral partnerships—between U.S. NGOs or private enterprises and developing country governments or NGOs—transfer knowledge and expertise to implement national sustainable development programs
- national-level partnerships—of developing country governments and local private enterprises, NGOs, or community-based organizations—enhance the sustainability of economic growth, delivery of social services, and management of natural resources

In late 2001, the United States announced the Global Development Alliance, a framework for leading, facilitating, and integrating partnerships between government agencies and private universities, nonprofit NGOs, and for-profit domestic and multinational firms. USAID administers its incentive fund and staffs the Alliance secretariat. This facilitates U.S. Government outreach to potential partners with significant resources to devote to countries receiving U.S. Government development assistance.

Alliance partnerships are a new development assistance business model and one of the pillars of USAID's reorganization and reform strategy. Governments and multinational development institutions are no longer the only assistance donors. Today, NGOs, PVOs, cooperatives, foundations, colleges and universities, corporations, and even individuals participate in development assistance. The Global Development Alliance's role is to create a synergy between private philanthropy and public assistance, thus increasing the impact of each.

Partnering for Sustainable Economic Growth

Public–private partnerships are at the heart of efforts to foster global economic growth through improved productivity and trade. Some partnerships address economic growth concerns

common to sustainable development: producing enough food to feed a growing global population, expanding investment and competitive global commerce, generating employment and incomes from environmentally sustainable enterprises, and increasing supplies of energy and potable water to meet industrial and urban demand.

The network of 14 International Agriculture Research Centers provides a prominent of example of a global public–private partnership that advances economic growth. Dedicated to research that increases food crop productivity, the centers are responsible for launching the "green revolution" of the last half-century. Their work today continues to boost crop yields and promote environmentally sound cultivation practices. The centers are responsible for the development of crops more tolerant of pests, disease, and drought that do not need costly and environmentally damaging agricultural chemicals. Crop breeding that boosts yields on lands suitable for cultivation means farmers can produce enough to eat and sell without resorting to use of environmentally fragile marginal lands. The centers' success rests on a partnership between international agricultural researchers, both from developed-country academic and commercial research institutions and developing-country government agriculture programs. Some 40 bilateral and multilateral donors and some private foundations contribute to this partnership at the centers, which receive an annual contribution from the U.S. Government that should reach $40 million in 2002.

In Armenia, the Department of Agriculture supports a Marketing Assistance Program that builds partnerships between experts at U.S. land grant universities and their local counterparts. The program offers a package of training, credit, and technical assistance to ease adoption of market-oriented practices and helps farmers identify opportunities for long-term market development in neighboring countries. In 2002, the program contributed funds to build an agriculture education system for the next generation of agricultural leaders. As an aspirant to WTO membership, Armenia will benefit from this assistance in meeting its requirements.

The U.S. Government supports partnerships with U.S. environmental NGOs and commercial firms to foster ecotourism in Kenya, Indonesia, and Madagascar. USAID has similarly teamed up with environmental NGOs in Latin America and the Caribbean to demonstrate how environmental stewardship can generate jobs and income. In 2002, the U.S. Government will provide $12.5 million for an ongoing Parks in Peril initiative in that region. Implemented in part by the Nature Conservancy, a U.S. NGO, the initiative organizes and equips communities in and around endangered protected areas to develop income and employment alternatives to logging, hunting, and farming. In the 10 years of the program, the Nature Conservancy has leveraged an additional $343 million in public and private sector funds for conservation programs in the region.

In Indonesia, a USAID-funded partnership between local communities and U.S. NGOs manages fragile coastal resources. With $10 million in U.S. Government funding, the partnership has begun replanting mangrove trees

and other coastal management activities that increase the abundance and variety of native fish species on which local communities depend.

The U.S. Trade and Development Agency fosters public–private partnerships through annual conferences and meetings of U.S. Government and developing-country government officials with representatives from sector-specific private enterprises. In 2002, the Agency budgeted nearly $1 million to fund meetings on clean water and more efficient transportation networks.

In sub-Saharan Africa, USAID sponsored cooperative agreements between developing-country utilities, the Business Council for Sustainable Energy, and the U.S. Energy Association. These agreements address power pooling and other ways to maximize efficiency of electric power generation; improvements in environmental performance; commercial provision of clean energy, and the expansion of its delivery for rural and urban populations. In 2002, USAID is budgeting $4 million for the program and expects to broker 11 partnerships with U.S. firms for investment in clean energy production and more efficient management of existing facilities.

Partnering for Sustainable Social Development

Public–private partnerships are central to effective delivery of health, education, and other social services, especially when public resources are limited and social needs are expanding rapidly. International and local PVOs and private commercial enterprises are enhancing public capacity to meet those needs, particularly by providing schooling and health care to millions of children who do not have access to education and are exposed to deadly communicable diseases.

The United States plays a lead role in providing structure and support for two critical global health partnerships: the Global Polio Eradication Program and the Global Fund to Fight AIDS, Tuberculosis, and Malaria. The polio eradication program is the outgrowth of a 20-year commitment by the U.S.-based NGO, Rotary International. With the HHS Centers for Disease Control and Prevention, WHO, and UNICEF, Rotary International has raised nearly $500 million and contributed to the certification of 150 countries as polio-free in 2000. The Global Polio Eradication Program has built and strengthened surveillance systems, established a global laboratory network, and trained epidemiologists. In 2002, Rotary International and its partners budgeted more than $50 million for immunizations in countries where polio is endemic. The Global Fund to Fight AIDS, Tuberculosis, and Malaria is newer, but by the end of 2001, it had garnered more than $2 billion in pledges from 30 countries, including $500 million from the U.S. Government. Substantial pledges came from more than 20 U.S. NGOs, international agencies, corporations, and foundations, including $100 million from the Bill and Melinda Gates Foundation.

A partnership of international scientists contributes to the work of the Cholera Research Laboratory in Bangladesh, a health research and outreach facility that benefits from public and private sector funding and a large grant from

the Bill and Melinda Gates Foundation. More than 30 years old, the laboratory developed oral rehydration therapies that saved millions of children from death by diarrheal diseases.
The International Micronutrient Malnutrition Prevention and Control Program is another U.S. Government-supported global partnership that brings together private industry (Morton Salt and Procter and Gamble), professional groups (International Council for Control of Iodine Deficiency and the Global Alliance for Improved Nutrition), U.S. Government agencies (HHS National Institutes for Health and Centers for Disease Control and Prevention), and international organizations (WHO, FAO, and UNICEF) to strengthen the capacity of partner countries to assess nutritional status and establish surveillance systems. USAID contributes funding.

In the survey, several examples of public–private partnerships in education emerged. Community-based partnerships with education systems could be seen in Africa. In Malawi, community organizations monitor pupils' classroom performance and pupil-teacher interactions. In Ethiopia, USAID helps local community partners make after hours use of classroom space in government-run schools for adult literacy and other community-sponsored programs.

Another exciting initiative is the partnership between the private U.S. Children's Television Workshop and the governments of Egypt and South Africa to develop local "Sesame Street" equivalents for educational television. With funding from USAID, these ventures reach an estimated 60 percent of targeted children under age 8.
In South Africa, a similar program reached 1.2 million children during its debut. Its projected audience is nearly 6.5 million children under 6 who do not have access to the equivalent of kindergarten.

In El Salvador, USAID sponsors a government and media partnership with

The Lifesaving Use of Bednets

Each year in Africa, about 2.5 million people die of malaria and malaria-related illnesses. Of these deaths, 2.25 million are children under 5. Research has shown that use of bednets treated with insecticide could reduce by 20 percent all childhood deaths in Africa—not solely those caused by malaria. Bednets could reduce severe malaria by about 45 percent, but there are not nearly enough available, even for the relatively few people who know about these lifesaving devices.

To reduce malaria deaths on a broad scale, USAID joined forces with six international and African manufacturers of nets and insecticide. This landmark partnership, NetMark, is making low-cost, insecticide-treated nets commercially available on a national scale in Ghana, Nigeria, Senegal, and Zambia. NetMark uses public sector funds innovatively to reduce barriers to commercial investment. The partnership is creating public demand for treated bednets and promoting appropriate use; removing taxes, tariffs, and other economic barriers; and making strategic investments to build local distribution capacity.

NetMark has been invited to consider starting programs in other African countries. If successful, the commercial partners will expand their distribution networks in sub-Saharan Africa. As NetMark expands, it will become more involved in designing subsidy programs and will work with the commercial sector to facilitate introduction of improved products. By October 2004, the partners project the sale of enough nets and insecticide retreatments to protect as many as 15 million African children.

Commercial companies, their local distributors, and a $50-million investment from USAID are funding the program. Commercial partners include global insecticide and net-making manufacturers (Aventis Environmental Science, BASF, and Bayer); makers of a long-lasting pretreated net (Vestergaard Frandsen); the world's largest net manufacturer (Siamdutch Mosquito Netting Co, Ltd.); and Africa's largest net manufacturer (A to Z Textiles). Other NetMark partners include an African consumer promotion company (Group Africa) and Africa's largest advertising agency (FCB Advertising).

one of the nation's major newspapers, *El Diario de Hoy*, that produces a monthly color Sunday magazine section with environmental games, activities, and messages for children. In Latin America, the Global Development Alliance supports the regional Partnership for Education Revitalization in the Americas, which grew out of the 1998 Summit of the Americas. With a relatively small investment from USAID, the partnership pushes for education reform, including community partnerships with school systems to build a constituency for better instruction.

The U.S. Government supports a partnership between the University of California–Davis and Samarkand State University in Uzbekistan to develop the capacity of scientists in the region to use geographic information systems technology to measure and monitor environmental change in the Central Asian Highlands. Kazakhstan University researchers have partnered with a consortium of U.S. university researchers to build the country's livestock and rangeland management capacity.

In Zambia, a higher education program has teamed up with Cleveland State University and Zambian Copperbelt University to train owners and employees of small and medium-sized enterprises. After their own training, Copperbelt University trainers will provide employees with hands-on factory floor skills and factory owners with managerial skills. The U.S. and Zambian university partners will use web-based training tools to help Zambian businessmen and workers become more competitive in southern African markets.

Similar U.S.–African university partnerships include one in agribusiness development between Ohio State University and Uganda's Makerere University and another in environmental management between Oregon State University and University of Botswana.

Partnering for Sustainable Environmental Stewardship

The U.S. Government has turned to public–private partnerships to manage larger programs. For example, the National Science Foundation, NASA, public agencies, and private organizations from developed and developing countries are tracking greenhouse gases as part of the Global Emissions Inventory Activity. The activity provides a scientific foundation for policy initiatives addressing climate change, stratospheric ozone depletion, and acid rain.

Through its Latin American and Caribbean Environmental Partnership Program, USAID sponsors meetings of government and industry leaders on environmental trade constraints, the benefits of clean production, and national and international opportunities to market eco-certified products. USAID has committed approximately $1 million a year over the past seven years to promote clean production, catalyzing about $8 million for clean production activities from international and bilateral donors.

Public–private partnerships for environmental stewardship include the USAID-sponsored Mexico Renewable Energy Program, involving Sandia National Laboratories, a private U.S. firm, and FIRCO, a Mexican federal agency. The partnership has sponsored nearly 200 photovoltaic and wind energy projects

in eight Mexican states, supplying about 100,000 residents with energy to pump water for human and agricultural use. In 2002, USAID provided $1.5 million to continue the program.

Working with the Center for Energy Efficiency in Moscow, the Environmental Protection Agency is helping develop and introduce energy-efficient building codes in 30 regions of Russia under a grant to the Natural Resources Defense Council. The codes have already avoided carbon dioxide emissions by almost a million tons a year, significantly reduced conventional pollutants, and prompted development of new construction materials and new building materials companies.

In Asia, the U.S. Global Development Alliance is leveraging private sector resources to develop renewable energy in remote areas of the Philippines—most notably conflict-prone Mindanao. USAID is helping electrify some 160 villages; U.S. firms are helping local communities install the alternative production equipment and providing maintenance training to lower electricity rates and simulate business investment.

Economic incentives improve the chances for responsible environmental stewardship. Economic benefits come with the protection of endangered habitats, and the U.S. Government sponsors such integrated conservation and development efforts by promoting community–national government partnerships.

USAID is helping governments in Kenya, Madagascar, Namibia, and South Africa partner with community-based organizations to maintain wildlife sanctuaries. Governments benefit because they need not hire and retain large park ranger staffs. Community-based organizations reap economic rewards from tourism. Similar programs operate in Indonesia, Nepal, the Philippines, and Sri Lanka.

In Russia, partnerships are emerging to plant trees and restore forests that store or sequester free atmospheric carbon dioxide in natural biomass. The U.S. Government and the University of Moscow is tracking progress toward building carbon stocks. The program is similar to one in Guatemala, where a U.S. utility firm paid for tree planting to offset carbon dioxide emitted from its coal- and diesel-powered electricity generation.

USAID has also fostered partnerships with American pharmaceutical firms to collect materials from tropical forests that will produce new drugs to treat disease. These bioprospecting agreements between U.S. firms and developing country governments have elevated awareness of the value of conserving tropical forests rather than logging them.

How Science and Technology Support Sustainable Development

Confronting new challenges and achieving sustainable development demand new knowledge and tools based on scientific assessment, testing, and prediction. New science produces new technologies. Technological progress and capable labor are fundamental to sustained growth.

Through technological developments and scientific insights, U.S. Government agencies and their global partners are making strides understanding, assessing, and predicting natural

phenomena, monitoring and managing resources, improving environmental quality, and building capacity.

Advances in science and technology underpin sustainable development. Such advances empower people, expand intellectual capital, and make new tools available. Technologies have improved significantly in the past decade, providing new perspectives to observe and understand the environment, and new options for sharing information. They include earth observation from satellites and buoys; global positioning systems that provide accurate georeferences; geographic information systems to organize and display data; and information management and dissemination systems that allow rapid, broad circulation of information. These and other advances offer new ways of envisioning and planning for economic growth, learning, and understanding and managing human and environmental resources.

U.S.-funded research pioneered development of many now-standard tools for monitoring, managing, and transforming problems into sustainable solutions. Of the 400 U.S.-supported initiatives reported in the survey, almost half have science and technology components. A few examples described here address the following challenges: identifying and applying new approaches; understanding, assessing, and predicting natural systems; monitoring and managing resources more effectively; improving environmental quality; and building scientific capacities

Identifying and Applying New Approaches

The challenges of sustainable development are enormously complex. Improving environmental quality requires a comprehensive research agenda, including the development of analytical tools that integrate social, economic, and natural sciences. Part of this effort involves harnessing information technologies to create new products and services, and new ways to communicate. This is needed, in part, to support policy formulation and decisionmaking that prevents or mitigates damage to social or ecological systems. With significant improvements in productivity and knowledge sharing, many scientific networks are using advances in data collection and information management systems to address issues at global, national, regional, and local levels. The United States is supporting a number of these efforts.

The Geographic Information for Sustainable Development initiative, a U.S.-led international alliance, aims to apply a new generation of earth observation data, state-of-the-art geographic information systems-linked technologies, and field-tested geographic knowledge to sustainable development problems. The alliance collaborates with many partners in Africa and developing countries, helping local, national, and international agencies to address long-term challenges, such as disaster mitigation, natural resource management, trade competitiveness, and poverty reduction. In 2002, USAID and the State Department contributed about $2 million to the initiative for training, capacity building, and technology transfer. Contributions of in-kind services, technical assistance, software, hardware, and an array of data products by NGOs, U.S. Government agencies, and the private sector more than tripled the value of the USAID and State Department contributions.

The David and Lucile Packard Foundation, the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA), and regional contributors funded Harvard University's International Initiative on Science and Technology for Sustainability, an open network of people and institutions dedicated to understanding the links between environment and development. The initiative fosters the infusion of science and technology in decisions about development challenges, including food security, human health, and poverty.

The Climate Information Project is developing another means of sharing information. Managed by NOAA's Office of Global Programs and USAID's Office of Foreign Disaster Assistance, Radio and Internet for the Communication of Hydrometerological and Climate Information makes climate and weather information available by means of radio and the Internet. The program was initiated with U.S. Government support, and is an international collaboration supported by a large array of humanitarian and meteorological organizations. It is available to extension and meteorological agencies as well as rural communities through training and technological development. Whenever possible, the program works with women and youth, important groups in the management of community and household resources. The program was successful in Africa, and is exploring needs and opportunities to expand the project.

The U.S. National Science Foundation supports the Inter-American Institute for Global Change Research in São Paulo, Brazil, one of three institutes that integrate multinational global change research programs. In May 2002, the Institute had 18 full members: Argentina, Brazil, Canada, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Uruguay, the United States, and Venezuela. It advances sustainable development by promoting the open exchange of environmental data produced in and by countries in the Americas, strengthening cooperative scientific research, and making available to policymakers enriched information about the impact of global change.

The International Cooperative Biodiversity Group seeks to improve human health through drug discovery as well as create incentives for biodiversity conservation. The program is creating new models for sustainable development through research and capacity building in biodiversity-rich developing countries. The program is funded and managed jointly by U.S. NGOs, public institutions, and developing-country institutions. U.S. Government participation includes

Helping Set the Science and Technology Agenda for Sustainable Development

The International Initiative on Science and Technology for Sustainability aims to contribute knowledge to environmentally sustainable development. The initiative aims to achieve significant progress by expanding the research and development agenda of science and technology for sustainability, strengthening infrastructure and capacity to apply science and technology to sustainability, and connecting science and policy more effectively in making the transition toward sustainability.

The International Initiative convened workshops in Nigeria, Thailand, Germany, Chile, and Canada to create regional science and technology research agendas.

In FY 2002, it also set up a web-based Forum on Science and Technology for Sustainability, and held a Synthesis Workshop on Science and Technology for Sustainable Development in Mexico City. That workshop made the case for the role of science and technology in sustainability to decisionmakers, articulated a shared vision, proposed strategies for achieving science and technology goals, and specified targets for 2005 and 2015.

HHS Fogarty International Center of the National Institutes of Health and other NIH institutes, the National Science Foundation, and the U.S. Department of Agriculture's Foreign Agricultural Service. The program is active in Argentina, Cameroon, Chile, Laos, Madagascar, Mexico, Nigeria, Panama, Suriname, and Vietnam.

Understanding, Assessing, and Predicting Natural Systems

How interactive physical, chemical, biological, and socioeconomic processes regulate the earth's systems and how this system responds to anthropogenic influences is not yet clearly understood. With the support of the U.S. Government, the scientific community is rising to the challenge, developing international research programs and tools to reduce such scientific uncertainties.

The Climate and Societal Interactions Division of the NOAA looks at the interface between scientific information and environmental and societal decisionmaking, particularly in relation to climate. The division promotes the study and use of new information tools to help society prepare for changing environmental conditions, cope with the challenges of multiple environmental and social stresses, and move toward a more sustainable future. One component is to foster dialogue between scientists and decisionmakers on new ways of using science to enhance human welfare. A key program element is the Applications Research Program, dedicated to bringing climate science and technology to bear on increasingly complex development challenges. The program is implemented regionally in Africa, Asia, Latin America and the Caribbean, and the Pacific Islands.

The Famine Early Warning System Network aims to strengthen the capabilities of countries and regional organizations to manage threats of food insecurity by providing timely, analytical information. The network is a collaboration among USAID, NASA, NOAA, the U.S. Geological Survey, and regional partners, including the Southern Africa Development Community. A private firm, Chemonics International, provides technical support. USAID supported a core program for 17 countries in sub-Saharan Africa with $6 million in FY 2002. Professionals in the United States and Africa monitor data and information—including remote sensing data and ground-based meteorological, crop, and rangeland conditions—that offer early indications of food security threats. The program is also strengthening African early warning and response networks by forging networks of hydrological, meteorological, and disaster professionals to prepare for and respond to food security problems. While there is serious concern about the food situation in southern Africa, in recent years droughts have not become widespread famines in the Sahel, southern Africa, and Ethiopia, primarily because of a combination of early warning and early public action. Designed in the late 1980s for sub-Saharan Africa, the program is now expanding to other regions. For example, USAID provided $1 million to monitor meteorological and crop conditions in Afghanistan in FY 2002.

The research capabilities of the Department of Agriculture are central to the sustainability strategy of the United States. USDA's Forest Service conducts some of the most extensive natural resource planning and assessment in the world. It uses

resource and economic modeling, environmental impact assessments, linear programming, geographic information system applications, multiple-use planning, and public involvement in natural resource decisionmaking. In the technical area of fire ecology and management, the Forest Service assesses the influence of fire on forest ecosystems, incorporating fire mitigation strategies into forest management systems. Other cooperators include national forest agencies, NGOs, private industry, and research institutions.

Numerous other projects increase understanding of the earth's processes. For example, an international team of researchers, the Nyanza Project Team, is conducting research on environmental change and climate variability through all of human history. The scientists—from four African countries, Europe, and the United States—recovered a 2,000-year-old record of atmospheric circulation and dynamics from sediments in Lake Tanganyika that revealed El Niño-Southern Oscillation and solar cycles.

Monitoring and Managing Resources More Effectively

U.S. scientists and partners around the world are applying new technologies and information to a wide range of pressing natural resource management problems. Five examples follow.

- A priority for NOAA's National Ocean Service is supporting coastal- and marine-protected area management and fostering integrated management. The service is working with Antigua and Barbuda to develop and implement a Special Area Management Plan for Antigua's northwest coast.
- USAID, the HHS Centers for Disease Control and Prevention, WHO, UNICEF, and other public and private partners have made great strides in ending death and disability from preventable childhood diseases. The focus now is on the 10 remaining countries with endemic polio: Afghanistan, Angola, Egypt, Ethiopia, India, Niger, Nigeria, Pakistan, Somalia, and Sudan.
- USDA's Agricultural Research Service is handling a large international portfolio. It embraces numerous cooperative research projects with Mexican counterparts on topics such as safeguarding grain crop germplasm, sequestering carbon dioxide, developing new molecular tools to assess germplasm diversity, and increasing food safety. Research funding was $400,000 for FY 2002.
- USAID pursues science and technology-based solutions to increase agricultural productivity. Through alliances with universities, international research centers, and NGOs, USAID helps bring science to smallholder farmers and small rural businesses to improve production and management.
- USAID supports vulnerability assessments and mapping relating to climate, seismic, and volcanic activities. Such vulnerability maps help reduce loss of lives and property; they are used to develop national land use policies and building codes for homes, roads, and bridges.

Improving Environmental Quality

Clean water, fresh air, and healthy food are critical for sustainable human development. Degraded environments undermine important ecological systems for

resource and economic modeling, environmental impact assessments, linear programming, geographic information system applications, multiple-use planning, and public involvement in natural resource decisionmaking. In the technical area of fire ecology and management, the Forest Service assesses the influence of fire on forest ecosystems, incorporating fire mitigation strategies into forest management systems. Other cooperators include national forest agencies, NGOs, private industry, and research institutions.

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human and economic growth. U.S. Government support for environmental activities covers a wide spectrum—from an initiative in one location to large bilateral agreements that involve many institutions worldwide.

USDA's Forest Service helps national governments assess their national forest inventory and develop monitoring systems. The service has integrated remote sensing and field technologies to monitor the health and status of forests for application to specific management issues to improve forest quality. Among current activities is work in Indonesia, Brazil, Mexico, and Russia.

Applying appropriate technologies to improve environmental quality, USAID supports borehole and well rehabilitation and maintenance to increase availability of potable water in drought-prone countries such as Eritrea, Ethiopia, India, Kenya, Pakistan, and Somalia. USAID also supports rainwater harvesting by building cisterns and ponds.

Working with Ducks Unlimited and other partners, including the governments of Brazil, Bolivia, and Paraguay, the Forest Service works to protect migratory birds and waterfowl. The project uses satellite technology and site-gathered information to develop a geographic information system database and models to detect land use changes in the Pantanal. Options for watershed protection and conservation of biodiversity are being developed.

The Asia Pacific Economic Cooperation strategy against disease, led and supported by the United States, includes a Network-of-Networks initiative to improve disease surveillance and monitoring in the region, boost national capacity to respond to outbreaks, and train the region's health authorities.

The Department of Health and Human Services' Safe Water System is a water-quality intervention that uses simple, inexpensive, and appropriate technologies. The objective is to make water safe through disinfection and safe storage using local products, and education on hygiene and sanitation. Public–private partnerships with strong NGO involvement, community mobilization, and social marketing are typically involved. Projects are under way in four countries in Latin America, seven in Africa, and three in Asia.

At the request of the African Wildlife Foundation, the USDA's Forest Service is helping the Foundation analyze watershed erosion and degradation and develop priorities for improving deteriorating watersheds in project areas of Kenya and Tanzania. ■

Applying Partnerships to Environmental Stewardship

"At its core, Johannesburg is about the relationship between human society and the natural environment."

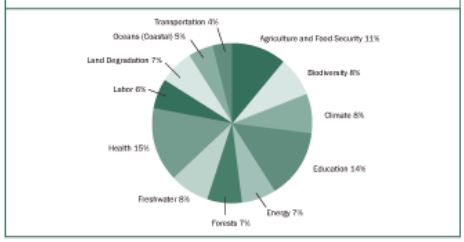
UN Secretary General
Kofi Annan
May 14, 2002

Environmental stewardship is the management of natural resources to conserve the natural environment so it can support life and provide current and future generations with clean air and water, plentiful and nourishing food, and reliable energy sources. Environmental stewardship addresses basic human needs and conservation of the environment, recognizing that the environment supports all life and livelihood on the planet and must be appropriately managed.

U.S. Support for Environmental Stewardship

The U.S. Government supports environmental stewardship through initiatives in 132 countries in all regions of the world. Nearly half of all initiatives surveyed support sustainable development through environmental stewardship, either totally (97 initiatives) or in part (91 initiatives). USAID alone spends about $600 million annually on environmental programs. U.S. environmental stewardship initiatives address agriculture and food security, biodiversity conservation, climate and global change, education, energy, forests, freshwater, health, land degradation, and oceans/coastal areas, as shown in the figure below.

Initiatives by Sectors and Subsectors



Many U.S. initiatives support multiple objectives, recognizing the inherently integrated nature of the global environment and its systems and products. For instance, reducing biodiversity loss in Brazil also decreases the threat of climate change by limiting greenhouse gas emissions in the forestry and energy sectors. Initiatives that conserve freshwater, ocean, and forest resources also help protect biodiversity. A case study in Honduras illustrates a multisectoral approach.

U.S. Government resource stewardship-focused initiatives promote good governance, PVO and NGO institution building, public–private partnerships, private sector financing, and science and technology.

Twelve U.S. Government agencies implement and support international resource stewardship initiatives through partnerships with various donors and development partners, including

indigenous and local-level NGOs and community groups, and with numerous government partners and enterprises. Partnerships are a cornerstone to the efforts supporting resource stewardship.

Strategies used by the United States to promote natural resource stewardship include the following:

- Fostering equitable economic growth along with resource conservation provides economic incentives to safeguard resources and reduces losses resulting from the over-exploitation of resources. Well-managed private sector initiatives can foster development while creating economic incentives for forest conservation, as shown by forestry programs in Bolivia. The Department of Interior's Sustainable, Bird-Friendly Coffee initiative enhances coffee quality, improves environmental management practices, and promotes sales of higher value sustainable coffees by farmers in Central and South America, the Caribbean, East Africa, and Southeast Asia. Ecotourism, which the U.S. Government supports around the world, also supports business and conservation interests simultaneously.
- Promoting social development and resource stewardship simultaneously can promote good health, which helps conserve the environment. In India, a partnership between a U.S. electric motor firm and the country's largest automobile manufacturer helped reduce lead and other air pollutants emitted in urban areas. Protecting the supply and quality of freshwater protects human health as well. U.S. Government initiatives, the largest in the world, support family planning and help stabilize world population and thus decreasing pressure on the environment.
- Linking capacity building and local empowerment enables communities to sustainably manage their own resources and provide for themselves. The U.S. Government builds individual and institutional natural resource management capacity overseas. For instance,

Improving Management of Watersheds, Forests, and Protected Areas in Honduras

In Honduras, USAID's natural resource management initiatives, which historically targeted the individual family or farmer, have brought 32,000 hectares of forestland under sustainable management, 6,500 hectares of farmland into cultivation using land and soil conserving technologies, and 118,000 hectares of protected areas under effective management. The current program is shifting the focus from the family and farm to community, municipal, and regional management organizations. USAID assistance has enabled 17 NGOs to become capable of managing protected areas effectively.

USAID is providing training, technical assistance, and supplies to local governments and NGOs to improve their ability to develop and manage critical water supplies and services. The initiatives improve health in participating communities, increase income by using water for energy and irrigation, provide more equitable access to water for domestic and productive use, and reduce damage and loss of property and life from flooding and drought. Water-related efforts are complemented by activities that support sustainable forestry and watershed management, implemented through the National Forestry School and grants to local environmental organizations to manage environmentally sensitive protected areas. The activities concentrate on watersheds that are critical to drinking water supplies. Training includes collection and management of basic hydrological and land use data, analysis of water resource constraints and opportunities, water use planning, and organization and administration of inter-municipal water districts.

the Peace Corps agriculture and environment programs build capacity as volunteers work with community citizens, farmers, and school children; provide training for service providers such as teachers; and offer assistance to local institutions, NGOs, and communities. Community-based approaches, including historically disadvantaged groups (such as women), are becoming the norm in natural resource stewardship because local communities are often the best stewards of their environment. U.S.-supported work in Namibia, for instance, involves numerous communities and NGOs in wildlife conservation and local economic development. U.S.-supported initiatives strive to be inclusive, addressing everyone affected by resource use and allocation.

- Undertaking information, education, and communications campaigns increasingly provide knowledge that enables individuals and communities to better conserve their natural resources. Since 1993, USAID's Environmental Education and Communication program has worked in more than 40 countries to promote sustainable activities by helping to change human behavior related to the environment. Technical assistance implemented through the USAID's GreenCOM program aims to improve the capacity of host-country agencies, institutions, and NGOs; build public support for environmental policies; expose target audiences to environmental issues; and disseminate relevant materials and information. GreenCOM provides expertise in such areas as environmental policy, biodiversity conservation, water resource management, energy, and solid waste management, using research-based methods and communication, education, participatory, and behavioral approaches to encourage people to live more sustainably with their environment. The Peace Corps currently has about 1,800 volunteers working in 62 agriculture and environment projects worldwide. The goal of these projects is to strengthen communities' ability to understand, conserve, and use natural resources in a sustainable manner. Strategies include environmental education and training for extension agents, teachers, farm leaders, and other service providers.
- Creative financing helps garner additional resources for resource stewardship. For instance, the United States has provided $25 million in debt reduction to Bangladesh, El Salvador, Peru, and Belize under the 1998 U.S. Tropical Forest Conservation Act, which provides for relief of official U.S. debt in return for forest conservation measures. Several other bilateral agreements are under discussion. As well, the United States has canceled $875 million in official debt owed by Argentina, Bolivia, Chile, Colombia, El Salvador, Jamaica, and Uruguay. Peru bought back debt to the United States valued at $177 million. Local currency generated over the life of the agreements is being directed to support environmental and conservation programs and, in some cases, child development initiatives. Since 1986, USAID has provided $16 million for 17 debt-for-nature swaps in Bolivia,

Cameroon, Chile, Côte d'Ivoire, Ghana, Madagascar, and the Philippines, retiring nearly $100 million in commercial bank debt and generating significant local currency for in-country forest conservation programs, often involving NGOs.

Many of the sustainable development initiatives that the United States supports are closely interconnected and mutually supportive. For example, support for more affordable and efficient energy in many countries means less pressure on forests as alternative sources of fuel as well as lower energy costs in production that contribute to greater competitiveness, employment, and consumer welfare. Combined, sustainable development efforts offer benefits that extend beyond each individual effort. When the range of talents and resources that public and private partnerships bring to responsible resource stewardship is added to the inherent interrelatedness of the sustainable development process, the potential to make a difference, despite the enormity of the need and the finite nature of available funding, offers real promise for progress in the decades ahead. All of the UN sustainable development goals are attainable once this interconnectedness is recognized and cultivated.

Recognizing the Critical Nature of Global Climate Change

The United States supports many programs addressing the challenges of global climate change.

Climate Variability and Change Research

Ensuring that its policies are informed by the best information, the United States is working aggressively to advance the science of climate and global change. The U.S. Global Change Research Program coordinates most U.S. research programs. Participants include the Departments of Agriculture, Commerce, Defense, Energy, Health and Human Services, Interior, and Transportation; the Environmental Protection Agency; the National Aeronautics and Space Administration; the National Science Foundation; and the Smithsonian Institution. The Office of Science and Technology Policy and the Office of Management and Budget provide oversight on behalf of the Executive Office of the President. U.S. programs build on research undertaken over previous decades by independent programs and researchers; many are coordinated internationally.

The Program concentrates its activities in six major areas:

- *climate variability and change programs* (FY 2001 funding of $533 million) look at climate change related to viability of agriculture, distribution and productivity of forests and rangelands, diversity of flora and fauna, availability of water, spread of insects and rodents that carry human disease organisms, and the intensity and frequency of floods and severe weather events
- *atmospheric composition research and observations* (FY 2001 funding of $345.6 million) improve understanding of ongoing changes in the atmosphere
- *global carbon cycle activities* (FY 2001 funding of $214 million) recognize that carbon is the basis for the food and fiber that sustains human populations, the primary

The U.S. leads the world in research on climate and other global environmental changes, spending approximately $1.7 billion annually since FY 2000 on its focused climate change research programs—roughly half the world's focused climate change research expenditures and three times more than the next largest spender.

energy source, and a major contributor to the planetary greenhouse effect with potential for climate change

- *global water cycle research activities* (FY 2001 funding of $312.6 million) are directed toward enhancing capabilities to quantify and predict trends in the global water cycle and the regional availability of freshwater sources studies
- *changes in ecosystems research and assessment efforts* (FY 2001 funding of $204.9 million) contribute to knowledge of effects of global change on ecosystems and effective ecosystem management and conservation
- *human dimensions of global change programs* (FY 2001 funding of $99.5 million) study the impact of human activities on the natural environment on local, regional, and global scales

In June 2001, President Bush announced the U.S. Climate Change Research Initiative aimed at reducing key areas of uncertainty in climate change science, identifying priority areas for additional investment in climate change science, and improving the integration of scientific knowledge into effective decision support systems. The President's FY 2003 budget includes $40 million for the initiative.

Place-based research on climate change and its effects provides a focus for increased understanding of the climate and generating information for effective decision making. The importance of place-based research is illustrated by studies in the Arctic, where the most severe environmental stresses are climate related.

To reduce the challenges posed by climate change in developing and transition countries, USAID launched a five-year, $1 billion Climate Change Initiative in 1998. The initiative provides assistance to developing and transition countries to help strengthen their participation in the UN Framework Convention on Climate Change. The initiative promotes sustainable development that limits the growth of green-

The Arctic Climate Impact Assessment

Climate variability and change, and more recently, notable increases in ultraviolet radiation, have become important issues in the Arctic over the past few decades. It is now imperative to examine possible future impacts on the environment and its living resources, human health, and relevant economic sectors.

Evaluating and synthesizing knowledge on climate variability, climate change, and consequences of increased ultraviolet radiation is the task of the Arctic Climate Impact Assessment, a project of the Arctic Council. During 2000 to 2004, it is gathering traditional knowledge, along with scientific and socioeconomic information. Its assessment is expected to lead to the development of useful, reliable information for the nations of the Arctic region, helping them identify policy options that address these environmental changes.

The assessment process is open and transparent, with broad participation of experts from many disciplines and countries as well as representation from Arctic indigenous peoples. The traditional knowledge being collected includes the changes observed by different Arctic indigenous communities due to climate change and variability, their observations of climate impacts, and the effects of such changes on their way of life, land and water use, diet, and social and cultural activities.

Three major volumes will be completed by 2004: a peer-reviewed scientific volume, a synthesis document summarizing results, and a policy document providing recommendations for coping and adaptation measures.

All eight Arctic-rim member states of the Arctic Council are contributing to the assessment, as are additional European governments with long-standing interest in Arctic research.

The United States is providing $600,000 in financial as well as in-kind support—through the National Science Foundation, National Oceanic and Atmospheric Administration, and the University of Alaska—to establish a Secretariat at the University of Alaska in Fairbanks.

Each country is also supporting the involvement of its citizens in the assessments and through in-kind contributions such as the hosting of meetings and workshops.

house gas emissions. Programs improve energy efficiency and increase the use of renewable energy sources, promote sustainable agriculture, improve urban services and transportation planning, protect forest resources, and implement forestry and farming techniques that preserve carbon stocks. The initiative supports technology transfer and public–private partnerships. USAID provides technical leadership and assistance to more than 40 countries and regions around the world.

As a part of USAID's five-year, $1 billion effort, the Ukraine Climate Change Initiative promotes integration of environment and economic development policies. The Ukraine Initiative's climate change information center and project management office in Kiev provides links to international climate change programs and organizations and maintains a database of all climate change activities in Ukraine. The center's staff provides technical assistance to government, industry, and NGOs to identify viable investment projects and develop ecologically responsible business plans, and helped Ukraine conduct a national greenhouse gas emissions inventory.

The centerpiece of USAID's global strategy to address the nexus between climate change and sustainable urban development is Cities for Climate Protection. The program assists municipalities to meet prevailing social and economic development challenges through approaches that reduce the urban contribution to climate change. In partnership with the International Council on Local Environmental Initiatives, USAID has worked with cities in Mexico, the Philippines, Indonesia, India, and South Africa; supporting policy reform, training, demonstration projects, emissions inventorying, setting local emissions reduction goals, and public–private partnerships.

The United States also engages the private sector to promote sustainable development and address climate change in developing and transition countries. USAID promotes programs that facilitate dialogue, build partnerships, and support direct investment in energy-efficient and other sustainable

El Niño and the Southern Oscillation (ENSO) Prediction Capability

The ability to forecast, predict, and disseminate information about El Niño and the Southern Oscillation (ENSO) events—which frequently cause economic and social damage in parts of the Americas, Africa, Asia, and the South Pacific—is improving dramatically thanks to U.S.-funded group research efforts. ENSO forecasts can play a key role in mitigating the impact of flood or drought that can lead to famine. NOAA operates oceanic buoys, develops models, and makes forecasts. The Inter-American Institute for Global Change Research coordinates efforts to document climate variability in the Americas and its links to changes in natural systems and societal impacts. ENSO forecasts can play a key role in mitigating the impacts of the floods or drought that can lead to famine. Famine, like drought, is a slow-onset disaster, so forewarning—through an Institute effort or a system like the Famine Early Warning System—may enable countries to reduce, if not eliminate, its worst impacts.

El Niño-caused climate variability frequently leads to economic and social damage from droughts and floods in parts of the Americas, Africa, Asia, and the South Pacific. Record losses associated with a particularly strong El Niño Southern Oscillation (ENSO) pattern during 1997 and 1998 included an estimated $90 billion in losses from storms, floods, droughts, and fires in 1998 and $67 billion in 1999. U.S.-funded efforts are playing an important role in linking predictions of climate variability with applications of that information in ways that are helpful to users of climate forecasts.

Even short-term El Niño forecasts have proved their value in Peru. There, warm (El Niño) years tend to be unfavorable for fishing; some have been marked by damaging floods. Cold (La Niña) years are welcomed by fishermen but not by farmers, as these years are frequently marked by drought and crop failures. Once an ENSO forecast is issued, farmers' representatives and government officials meet to decide on the appropriate combination of crops to maximize overall yield. A forecast of El Niño weather might induce farmers to sow more rice (to take advantage of greater precipitation) and less cotton (which can handle drier conditions). ENSO forecasts have also helped farmers in Australia, Brazil, India, and various African nations.

development projects. The Eurasian-American Partnership for Environmentally Sustainable Economics (EcoLinks) is an example of a project where a large percentage of its technology transfer is climate-related. USAID launched the EcoLinks initiative in 1998 to help solve urban and industrial environmental problems by improving access to financial resources, trade and investment, and information technologies.

Building Capacity to Address Climate Change

Building capacity to address regional implications of climate changes and to undertake regional research projects is a key U.S. Government effort. The U.S. National Science Foundation and international partners support the SysTem for Analysis, Research, and Training program to develop regional networks of collaborating scientists and institutions to enhance global change science capacity in developing countries, train global climate change scientists, and provide access to data, communication technology, and global climate change research results.

Building human and institutional capacities was also the task of the U.S. Country Studies Program, which provided technical and financial support to 56 developing countries to help them develop a country inventory of greenhouse gas emissions, assess vulnerability to climate change, and evaluate strategies necessary for mitigating and adapting to climate change. Drawing on technical experts from nine U.S. Government departments and agencies and led by the Department of State, the program helped countries and international institutions produce more than 160 major country reports, 10 guidance documents, 60 workshop and conference proceedings, and 16 special journal editions. Funding for the Country Studies Program was $9.4 million from 1997 to 2000.

Improving climate change technology research and development is a major U.S. commitment. Programs enhancing basic research, strengthening applied research through public–private partnerships, developing improved technologies for measuring and monitoring gross and net greenhouse gas emissions, and supporting projects for new technologies include the National Climate Change Technology Initiative and the Nature Conservancy project.

The Nature Conservancy project uses newly developed aerial and satellite-based technology to study forests in Brazil and Belize to determine their carbon sequestration potential. The research partnership, composed of the Department of Energy, the Nature Conservancy (an NGO), and companies such as General Motors and American Electric Power, is studying how carbon dioxide can be stored more effectively by changing land-use practices and investing in forestry projects. The United States will provide $1.7 million of the $2 million cost of the three-year project.

Meeting Energy Challenges

Energy is central to many aspects of life—food production, health, heating and cooling, lighting, communications, education, industrial production, and transportation. In development terms, energy is a tool to achieve broader development goals in health, education, environmental protection, and economic growth. Unfortunately, more than 2 billion people around the world do not have access to modern energy services and technologies. In Africa, for

example, many women spend up to six hours a day manually milling grain that could be milled electrically in a fraction of the time.

Clean, efficient production and use of energy reduces consumption of natural resources. Developing countries are well positioned to make use of sustainable technologies to expand their energy infrastructure and increase energy supplies without degrading the environment. To achieve and maintain social and economic progress, developing countries and economies in transition need to expand their access to clean, affordable energy supplies, while minimizing pollution and waste.

U.S. Initiatives Help Address Energy Challenges

The United States helps countries address their energy challenges, including supporting use of more efficient, less polluting power sources like natural gas and renewable energy. Renewable energy, energy efficiency, and clean-energy technologies are decreasing in cost, making them viable options for the developing world's growing energy needs. The U.S. Government also works to improve the quality of energy services by promoting private sector involvement in energy generation and distribution, working with local, provincial, and national energy agencies to increase their capacity to provide safe and affordable energy equitably.

USAID and the Department of Energy lead U.S. Government efforts to support sustainable development through energy-related initiatives. The Trade and Development Agency, the Export-Import Bank, the Overseas Private Investment Corporation, and the Environmental Protection Agency also play a role. The U.S. Government's portfolio includes promoting energy sector reform that supports free-market policies and sound energy pricing; encouraging energy conservation; increasing use of renewable energy sources and clean-energy technologies; increasing equitable and efficient access to energy, particularly by poor and remote populations; building capacity in public and private energy institutions; and instituting improved energy standards.

Most U.S. Government energy initiatives address two or more sustainable development areas, such as climate change, health, economic growth, trade, and transportation. An initiative

Europe and Eurasia Power Sector Reform

In 17 countries in Central and Eastern Europe and Eurasia, USAID has supported systemic power sector reform—developing legal and regulatory frameworks, unbundling monopoly systems, creating modern electricity markets, and opening up to private sector investors. Its program has supported creation of autonomous energy regulatory bodies with authority for pricing and reforms. USAID supported the national regulatory bodies' creation of a professional regional energy regulatory network—the Energy Regulators Regional Association, based in Budapest. USAID has also supported reform by implementing 45 public–private partnerships between energy companies in the region and U.S. utilities and energy companies.

USAID helped countries in the region engage their national systems in regional networks and markets to improve access to electricity supplies, and their reliability and cost effectiveness. USAID promoted institutional development of private energy efficiency engineering firms in Armenia, Bulgaria, Hungary, Poland, Romania, and Ukraine. With the U.S. Department of Energy, USAID helped form nongovernmental energy efficiency centers in several countries. After initial success in that area, USAID is helping set up the Municipal Network for Energy Efficiency to improve energy efficiency policies and disseminate best practices. This has provided the basis for innovative credit arrangements, such as Bulgaria's Development Credit Authority that guarantees bank loans for energy efficiency projects to small private and municipal borrowers. In 2001, Bulgaria's municipal energy efficiency component grew significantly, as lending reached nearly $1 million to private and municipal borrowers with a pipeline of almost $5 million. Similar programs are now being implemented in other southeastern European countries.

might, for example, reinforce how local access to a reliable energy source can contribute to community empowerment and good governance. As in other sectors, the U.S. Government uses a variety of means in its energy initiatives to reach the common goal of clean, efficient energy systems throughout the developing world.

Assisting National Energy Agencies

USAID's work assists national energy agencies and encourages private investment in clean, efficient energy systems. These efforts have produced significant, sustainable results in more than 65 countries. In Europe and Eurasia, USAID is helping in substantial ways to reform national systems and encourage industries to develop more efficient systems.

The USAID Energy Efficiency program collaborated with the Environmental Protection Agency and countries in southern Africa and Asia to phase out use of leaded gasoline. In Panama, USAID was successful in helping the newly established Environmental Authority develop a policy that promotes investments in cleaner production technologies for industry.

Under the Collaborative Labeling and Appliance Standards activity, 10 countries are creating national labeling standards for energy efficiency. For example, Ghana established standards for air conditioners and is now pursuing standards for refrigeration. The Department of Energy works in the Baltic countries, China, Central Europe, Mexico, and Ukraine, and with a variety of multilateral donors, government, and private sector partners to develop energy-efficient labels and standards for building appliances and equipment. In Ecuador, USAID worked with selected industries to save over $5 million annually through implementation of pollution-prevention and energy-efficiency practices and investments in cleaner production technologies.

USAID is working with various countries in Africa to promote cross-border energy training to reduce the cost of electricity. For example, USAID, in partnership with other bilateral and multilateral donors, supports the Southern Africa Power Pool, an international power pool that coordinates transborder energy trading and harmonizes regional energy policies to recover costs fully and share benefits equitably. The Pool covers 12 countries, 9 million square kilometers, and 200 million people. It is the first international pool in the developing world. USAID's program with the Pool was instrumental in accelerating a recent $150 million World Bank-funded transmission interconnection project.

Working Toward Clean, Efficient, Safe Transport Services

The U.S. Federal Highway Administration implements programs to achieve safer, more efficient, and cleaner transportation services in a number of countries. The program builds on national and international programs that promote appropriate technology transfer to increase opportunities to leverage funding. It is improving access to transportation technology and information through a network of centers that facilitate foreign investment and international trade in Botswana, Czech Republic, Hungary, Malawi, Namibia, Russia, Slovakia, South Africa, Tanzania, Zambia, and Zimbabwe. The activities of the program include the following:

- helping establish technology exchange centers
- facilitating twinning relationships between state departments of transportation and their counterparts
- promoting public–private sector business linkages between the United States and partner countries
- fostering technology and knowledge sharing between the United States and partner countries to stimulate economic growth and trade

Transportation services in much of the developing world offer ample scope for the clean and efficient use of energy. The U.S. Federal Highway Administration is instrumental in implementing programs aimed at achieving safer, more efficient, and cleaner transportation services in countries around the world.

Helping Provide Access to Electricity

Providing access to electricity is an important program focus. A USAID and U.S. Department of Energy Village Power project provides electricity for the first time to rural communities in more than 30 countries. The project relies primarily on solar, wind, micro-hydro, biomass, and other renewable forms of energy; it helps reduce pressure on finite fossil fuels and reduces greenhouse gas emissions while providing electricity for lighting, refrigeration, education, and small and medium-sized industry. The project not only improves quality of life, but helps alleviate poverty and slows migration to urban areas.

A USAID initiative in South Africa promotes energy equity, energy-efficient housing, and, recently, energy efficiency in municipal services. By leveraging private sector finance and investment, more than 70,000 historically disadvantaged households have electricity. The initiative has also been instrumental in building alliances with national and local government partners, the private sector, and in-country NGOs to improve equitable access to electricity and to increase energy efficiency in South Africa.

In Mexico, more than 5 million people lack access to grid electricity. More than 100,000 rural communities need potable water. More than 600,000 farmers and ranchers need water for livestock and crops. Seizing the opportunity to tap Mexico's abundant solar and wind resources, USAID started the Mexico Renewable Energy Program, a partnership of USAID, Sandia National Laboratories, and FIRCO, a federal

Transferring Power Technology Aids India

Most power in India is produced by burning high-ash coal, which contributes to making the county the second fastest-growing generator of greenhouse gases (after China), and the sixth largest generator in the world. With the majority of 1 billion Indians still dependent on agriculture for their livelihoods and hundreds of millions vulnerable to drought and flood, India is taking a hard look at global climate change. Important in this equation is the National Thermal Power Corporation, India's largest single generator of electricity.

The Center for Power Efficiency and Environmental Protection is a model for technology transfer and cooperation between USAID and India. The demand for the center's services and the impressive results of their generation-side efficiency improvements have prompted its expansion beyond the original center on the outskirts of New Delhi to the regional capitals of Lucknow and Patna. USAID has been working in close collaboration with the U.S. National Energy Technology Laboratory and the Tennessee Valley Authority to provide support to the new regional offices by procuring cutting-edge testing and diagnostic equipment and training staff in its use. The $700,000 in USAID assistance for equipment purchase has prompted the National Thermal Power Corporation to invest $1.25 million of its own funds to procure additional testing equipment.

India currently produces 100,000 megawatts, and the government plans to double generation capacity in the near future. USAID has collaborated for a number of years with a range of partners from India and the United States on greenhouse gas mitigation activities.

Collaboration with the Center represents one of the most effective partnerships in mitigating greenhouse gases and has resulted in avoidance of over 7.4 million tons of carbon dioxide equivalents cumulatively since 1997. This work, coupled with USAID other important contributions in demand-side management, energy efficiency, and renewable energy, has helped avoid another 2.1 million tons of carbon dioxide.

USAID and National Thermal Power Corporation have also partnered to promote water conservation and recycling in coal washing and utilization of fly ash as a construction material; the goal is to reduce the environmental hazards, particularly contamination of scarce ground water, posed by current practices. USAID is also funding a feasibility study for an Integrated Gasification Combined Cycle power plant—the cleanest technology available to produce power from coal. The center's efforts, along with demand-side contributions in management, energy efficiency, and renewable energy, have averted more than 9.5 million tons of carbon dioxide and equivalents since 1997. The passage of India's Energy Conservation Act and formation of the government's new Bureau for Energy Efficiency have given concrete expression to policy achievements in energy production and use.

agency under the Mexican Secretary of Agriculture. Under this program, Mexican farmers and ranchers have installed more than 200 water pumps powered by solar, wind, and diesel for livestock, crop irrigation, community wells, and other uses that support economic growth. In 2000 this project culminated in a $31 million World Bank loan that will support installation of 1,255 solar- or wind-powered agricultural pumping systems by 2005.

Fostering Pollution Abatement

Pollution abatement is an important dimension of U.S. Government-supported energy programs. An initiative led by the U.S. Environmental Protection Agency seeks to improve air quality in developing countries by working to build and strengthen air quality management capacity at regional, national, and local levels. The key emphases for this initiative are:

- air quality management training through development of the Clean Air Training Network for Asia, a new training center
- liaison with the World Bank's Clean Air Initiatives for Latin America, Asia, Africa, and Eastern Europe
- the development of tools, information, and approaches to combat air pollution, particularly air emissions from vehicles that are the leading cause of air pollution in most developing cities, with a focus on phasing out use of leaded gasoline and reducing sulfur in diesel and gasoline fuels
- technical assistance and capacity-building activities in priority countries and areas, including India, Russia, Central America, China, Mexico, southeast Asia, and Africa

In Egypt, USAID has two energy programs. The Cairo Air Improvement Project seeks to reduce greenhouse gas emissions and lead, particulates, and smog-forming emissions from motor vehicles in the region. Under the project, USAID promoted clean-burning compressed natural gas use in the transportation sector; in FY 2000, sales exceeded expectations, rising from 20.2 million to 28.8 million gasoline gallon equivalents. Under the Egyptian Environmental Policy Program, USAID provides assistance to the Energy Efficiency Council, a consortium of leading public and private sector organizations that recently completed a National Energy Efficiency Strategy Framework for Egypt. The effort involves numerous stakeholders and calls for the adoption and implementation of policy reforms and market initiatives to help achieve the national objectives of economic development, a sustainable national energy supply, and environmental protection. Energy efficiency service companies increased from 9 to 13 in 2000 and should total 21 in 2003.

The U.S. Department of Energy has a long history of working with U.S. cities to promote use of clean transportation fuels. The Department shares its Clean Cities model with cities in Mexico, Chile, India, Peru, Philippines, Brazil, Costa Rica, Guatemala, Trinidad and Tobago, Bangladesh, and Nepal to facilitate deployment of alternative fuel vehicles and quantify their local and global emission benefits. This program works with multilateral donors, national and local government counterparts, and the private sector.

Sharing Energy Technologies

The U.S. Government supports sharing scientific technologies in the energy area. For instance, USAID has a long history of providing technical assistance

and training to Indian energy agencies and municipal governments. The Center for Power Efficiency and Environmental Protection is a model for technology transfer and cooperation between USAID and India. Center engineers received much of their training to improve supply-side energy efficiency from U.S. private and public sector institutions, such as the Southern Research Institute, Electric Power Research Institution, Tennessee Valley Authority, and the U.S. Department of Energy's National Energy Technology Laboratory.

Maintaining Biodiversity and Conserving Critical Ecosystems

Biodiversity is being lost more quickly today than at any time since the extinction of the dinosaurs. Extinction rates are currently 100 to 1000 times faster than historical rates, with 10,000–25,000 species lost each year. Twenty percent of the world's species will be extinct within the next 30 years. Extinction is not only occurring in temperate and tropical terrestrial ecosystems, but also throughout marine and coastal ecosystems. Human activities are driving species to extinction through conversion of natural habitats around the world, over-exploitation of living resources, and pollution.

When we lose biodiversity, we lose the very foundation of Earth's essential goods and services. For example:

- A third of all food is prepared from plants pollinated by insects and wild animals. The FAO estimated the 1995 contribution from pollination to the worldwide production of just 30 of the major fruit, vegetable, and tree crops to be about $54 billion per year.
- Fundamental ecosystem services such as pollination, water purification and supply, soil formation, flood and storm protection have been valued at $33 billion a year.
- Fifty-seven percent of the 150 most prescribed drugs have their origins in nature. Despite such widespread use, only 2 percent of the 250,000 described species of vascular plants have been screened for their chemical compounds.
- Traditional medicine, which relies on species of wild and cultivated plants, forms the basis of primary health care for about 80 percent of all people living in developing countries.
- Farmers around the world spend about $25 billion annually on pesticides; natural parasites and predators in the world's ecosystems provide an estimated 5 to 10 times this amount of free pest control.
- Wild species are the gene bank used to maintain the vigor of our crops and livestock.

Conservation of biodiversity is thus essential to environmental and economic sustainability. Biodiversity underpins ecosystem integrity and functions while influencing resilience and resistance to environmental change. The diversity of life constitutes a unique resource for this and future generations. It is clear, however, that the battle to keep the earth's biological diversity, as currently fought, is being lost.

Many developing countries have ecosystems with a trove of biological resources and still-undiscovered plant and animal species. Through U.S. Government funding, often with USAID and U.S.-based NGOs, the United States is helping countries link

"Biodiversity is declining at an unprecedented rate—as much as a thousand times what it would be without the impact of human activity. Half of the tropical rainforests have already been lost. About 75 percent of marine fisheries have been fished to capacity. Seventy percent of coral reefs are endangered."

UN Secretary General
Kofi Annan
May 14, 2002

their economic and social development with the conservation and sustainable use of natural resources. An interesting example is the case of the Meso-American Biological Corridor.

Improving Environmental Management in the Meso-American Biological Corridor

The Meso-American Biological Corridor, a network of rainforests and other pristine ecosystems rich in diverse plant and animal life, is home to one of the largest and most unique conservation efforts currently underway in the world. The corridor includes not only pristine ecosystems but also a myriad of land uses. Spanning from Mexico to Panama, the corridor is home to a wealth of rare fauna and flora as well as many indigenous communities. Although Central America accounts for less than 1 percent of the world's total land surface, it contains an estimated 7 percent of the planet's known biodiversity.

Over the course of a six-year, $37.5 million activity, USAID is working alongside a host of partners, including the Central American Commission on Environment and Development, the Global Environment Facility, UNDP, the Inter-American Development Bank, the German aid agency, several national governments, U.S. and local NGOs, and the U.S. EPA. The focus is on providing technical assistance and financial support for improved protected areas management, promotion of environmentally-friendly products and services, harmonization of environmental regulations, and increased adoption of less-polluting technologies and practices.

Sustainable tourism practices are being promoted through alliances, capacity building, accreditation, and mapping of tourism operations in targeted sites. Tourism certification in Mexico, Belize, Guatemala, and Honduras has already facilitated the establishment of the Meso-American Alliance for Ecotourism Development. There are also efforts underway to widen market access for environmentally sound products and services, and to develop marketing strategies for "green" products, such as biodiversity-friendly agriculture, organic goods, and ecotourism. In conjunction with commission, USAID is supporting the balancing of regional environmental standards and the implementation of international environmental agreements and conventions. USAID is also supporting an assessment of opportunities for addressing pollution problems and potential financing options for pollution reduction projects.

This program encourages productive and sustainable use of natural resources by developing viable economic activities by which people can earn their livelihoods. In this way, the initiative uses environmental conservation as a catalyst to alleviate poverty and improve quality of life, foster regional cooperation, and preserve the region's rich cultural heritage.

USAID pioneered and now supports one of the most comprehensive biodiversity conservation programs of any bilateral donor. It has supported sustainable natural resources management and biodiversity conservation in more than 60 countries over the last nine years. Activities include establishing and managing protected areas; assisting in formulating policy, legislation, and regulations supporting biodiversity conservation; and supporting international multilateral environmental agreements.

Several initiatives illustrate the range of U.S.-supported activities to preserve biodiversity.

- The Smithsonian Institution's Monitoring and Assessment of Biodiversity Program is an international leadership program to provide support and training to biodiversity monitoring and assessment projects in developing countries. Begun in 1986 as a joint agreement between the Smithsonian and UNESCO, the program's mission is to better understand the world's forest biological diversity and its trends, and to make the resulting information available for a wide range of users. This research is accomplished through a network of sites under different degrees of management and utilization. In cooperation with agencies, researchers, and program counterparts, a protocol for establishing and monitoring biodiversity plots has been developed and implemented in nearly 62 sites.
- NOAA and the National Marine Fisheries Service are supporting the Turtle Excluder Devices program. Started in Mexico, the program has been extended to 40 countries, providing training to officials responsible for the protection of

1993–2001 period puts forest loss rates at 2.6 percent and 3.5 percent in USAID intervention zones. Forest loss in comparable non-intervention zones was 6.7 percent.

- A USAID-supported indigenous governing organization in Bolivia successfully protected 4.6 million hectares of tropical forest in the Kaa Iya protected area from petrochemical development.
- USAID's partnership with the Nature Conservancy in Paraguay has supported priority conservation initiatives, developing a broad conservation vision for the Chaco and Pantanal ecoregions. The goal of the cross-border project is to strengthen the capacity of Paraguayan public and private organizations to conserve biodiversity within these globally important ecoregions by developing public and private sector conservation initiatives in coordination with neighboring countries that share the same habitat types and riverine systems. The results will lay the foundation for complementary initiatives, further upgrading Paraguay's biodiversity conservation portfolio.
- USAID is working with the World Wildlife Fund to conserve the globally significant biodiversity of the Bering Sea by protecting key sites and wildlife populations, as well as shaping development policies for improved stewardship in collaboration with local communities, the private sector, and the U.S. and Russian governments. USAID funding has allowed the World Wild Life Fund to obtain new support, thereby expanding conservation efforts in the region. Through extensive education programs, ecosystem monitoring, and regular contact and cooperation with local and national-level government personnel, a new marine zone for Nalychevo Nature Park on the east coast of Kamchatka has been created. The area will cover 76 square miles of marine and coastal habitat, protecting seal and seabird rookeries in the western Bering Sea.

Water—Taking an Integrated and Sustainable Approach

Successful management of water resources is one of the most critical issues facing humanity. Clean, safe fresh water is vital for the life and health of people and ecosystems; it is also a central resource for economic and social development. Water security is indispensable to sustainable development.

The U.S. Government shares in the global consensus that achieving a water-secure future for all the earth's human residents and natural systems will require a much different way of managing our shared water resources. Historically, water management has tended to compartmentalize the human relationship to water resources by considering each activity and use separately. Water for drinking, to manage waste, for irrigation, for industrial activity, for navigation, to produce energy, to support productive estuaries and fisheries, and for environmental health have each been treated as distinct political, economic, or management issues, without a deep appreciation of the fundamental linkages among them or the enormous ripple effects that can occur upstream and downstream.

Water security is essential for sustainable development. Underpinning water security are important concepts:

1) water should be appropriately valued; 2) sustainable water resources ensure the integrity of ecosystems; 3) all people should have access to safe and sufficient water and sanitation systems, 4) equitable allocation of water means having water sufficient to produce food for the world's population, 5) peaceful cooperation should characterize use of shared water resources; and 6) people should be safe from water-related hazards such as floods, droughts, and pollution.

The growing consensus on how to achieve water security is through an Integrated Water Resources Management approach. This approach sets out a participatory planning and implementation process, based on sound science, which brings together stakeholders to determine how to meet society's long-term needs for water and coastal resources while maintaining essential ecological services and economic benefits.

The integrated approach provides for planning and management of freshwater, land (especially watershed), and marine resources, taking into account social, economic, and environmental factors. Consideration is given to integrating surface water, groundwater, and related ecosystems; water quality; and equity for individuals and regions. Integrated water resources management relies on collaboration and partnerships at all levels, from individuals to international organizations. The United States promotes integrated water resource management by implementing innovative projects in countries throughout the world, leading international discussions and strategic planning exercises, coordinating policies among donors and lenders, and participating in international forums and UN committee sessions.

U.S. Government agencies and their partners support programs that help countries protect and deliver clean water to their people. The programs address many water security issues, including water supply, sanitation, and wastewater management; natural resource management; economic development and food security; and disaster preparedness and avoidance. Many foster participatory planning and implementation, based on sound science that brings stakeholders together to determine how to meet long-term needs for water while supporting essential ecological services and economic benefits. As the lead U.S. Government agency working in international water issues, USAID has directed substantial resources to various aspects of water resources management, water

Increased Conservation and Sustainable Use of Water Resources

USAID has a five-year (1999–2004), $100 million commitment to promote integrated water resource management, improve ecosystem and water resources management, and contribute to improved environmental management and economic growth in numerous countries. For example, the program promoted decentralized freshwater resources management in Morocco and El Salvador, helped the Central Asian Republics improve policy for sustainable freshwater resources management, and supported Jordan's implementation of improved freshwater policies to manage its chronic water deficit.

Integrated water and coastal resources management focuses on entire river basins, aquifers, or water basins, and involves stakeholders in participatory, transparent planning and implementation. Stakeholders determine how to meet society's long-term needs for water and coastal resources and short-term needs for ecological services and economic benefits. Under this approach, local communities are becoming more effective natural resources managers. With institutional strengthening, NGOs are effectively implementing integrated programs programs. Host-country governments are promoting effective natural resource policies and programs, and developing countries are benefiting economically as freshwater and coastal resources are used sustainably and conserved.

availability, sustainable use, and governance, totalling at least $11 billion over the last 30 years, and well over $400 million annually in recent years.

Water Supply, Sanitation, and Wastewater Management

It is increasingly important for developing countries to use existing resources more efficiently and improve municipal governance and infrastructure services. USAID is on the cutting edge of efforts in water, sanitation, and solid waste management projects, supporting programs worldwide.

- In late 2001, USAID and the Conrad N. Hilton Foundation initiated the Water for the Poor: The West Africa Water Initiative, a partnership to maximize the impact of development investments by both the U.S. government and the private sector. The initiative seeks to invest in potable water supply activities based on an integrated approach to water resources management. Collaboration with other organizations will create programmatic synergy and draw on the complementary strengths of affiliated partners. The budget is provisionally estimated at $5–$10 million per year.
- In the Middle East, more than half of U.S. support for water security goes to its very arid regions. For example, since the start of American aid to Egypt, the U.S. has spent more than $2.8 billion to improve Egypt's urban water and wastewater infrastructure and increase service to more than 22 million people. In the 1980s and early 1990s, programs concentrated on Cairo and Alexandria. Since then, the program has shifted to smaller, underserved locations. The United States has also emphasized the institutional development (including improved regulations and cost recovery) of local utilities to develop sustainable services. The year 2002 will see construction initiated on three large-scale water/wastewater facilities. As the infrastructure construction program winds down, U.S. emphasis will shift to reform of regulatory structures and policy issues in the water sector. This includes improving operating efficiency, strengthening commercial practices, and promoting private sector investment.
- In Jordan, USAID-funded activities focus on three issues affecting water scarcity, which remains the single most critical factor affecting Jordan's chances for sustainable economic growth. First, USAID promotes more effective water management by improving data collection, institutions, and the policy framework. Second, the agency supports more efficient water use by rehabilitating water systems and introducing modern water-use technologies. USAID rehabilitated 10 springs and wells and modified the Zai Water Treatment Plant. Third, USAID supports improving and expanding wastewater treatment capacity. USAID funded construction of the new wastewater treatment facility at Wadi Mousa, near Petra; expansion of the wastewater treatment plant in Aqaba; and the new build-operate-transfer wastewater treatment plant at As-Samra outside Amman. Improvements in wastewater treatment and reuse are focusing on increasing the amount of water available for agricultural use in Jordan.

- In Africa, EPA's ongoing efforts to improve drinking water focus on building the capacity of local water professionals and communities to provide safe drinking water. These efforts were a result of EPA's International Safe Drinking Water Initiative launched in 1999. EPA's Africa program involves a partnership with Water For People, a U.S.-based NGO, to address the water and sanitation needs of the urban poor. Working in Kenya, Malawi, Tanzania, Uganda, and Zambia, the partnership is supporting innovative approaches, fostering water sector reform, strengthening local water associations as agents of change, and sharing lessons. The key to the sustainability of EPA's Africa program—and its similar program in Central America—is in the partnerships developed and nurtured with stakeholders in each country, particularly the national municipal institutions, NGOs, community leaders, and decisionmakers. EPA has worked closely with these groups to assess the needs, identify the local experts, develop action plans, and bring the appropriate stakeholders to the table. EPA continues to strengthen these programs to provide the tools and knowledge needed to improve local and regional drinking water quality and meet sanitation needs.
- In Central America, in response to the devastation of Hurricane Mitch, USAID joined forces with other U.S. Government agencies to help rebuild the region. Several programs sought to improve drinking water quality by strengthening laboratories, optimizing treatment plant operations, protecting water sources, and developing safe drinking water programs. Through train-the-trainer workshops, technical assistance, and hands-on practical experience, water professionals, decisionmakers, laboratory personnel, NGOs, and community members learned how to analyze water quality data and use them to make decisions.
- In El Salvador, USAID is helping increase access by rural households to clean water through local governance programs, resulting in 24 decentralized water systems now serving more than 11,000 rural families. The project helps ensure that water resources management and regulation and water services provision are strengthened and supported at the local level.
  The focus is on entrepreneurial approaches to operations and management that involve active participation by local NGOs and utility companies. Key components that have helped attract private financing include strengthened local management that facilitates public participation in the local control of water systems, management of water resources at the watershed level, cooperation between and within watersheds, more equitable access to water, land-use control through zoning, and regulating the use and abuse of water resources.
- In the southern Caucasus, with USAID assistance, a three-year integrated water management project in the Araks/Kura Basin is building capacity for sustainable water resource management in Armenia, Azerbaijan, and Georgia. The project focuses on national level systems and local level approaches to monitoring water quantity and quality to address environmental degradation.

Resource Stewardship in the Panama Canal Watershed

Since 1998, USAID's GreenCOM program has been working in Panama to enable students, the media, and communities to take greater care of their resources through public information and communications campaigns. The GreenCOM project offers technical assistance in environmental education and in strategic communication to institutions responsible for sustainable management of the Panama Canal watershed, which is vital to safeguarding freshwater resources. The program is to continue through early 2006 and cost $6.1 million. It aims to increase public awareness, reinforce municipalities' capacity to deal with local environmental issues, protect the national parks and protected areas, and reinforce the capabilities of NGOs and national institutions to implement environmental laws and regulations.

A highly successful television, radio, and print media campaign heightened awareness of the benefits of the watershed. For students in 26 selected primary schools of the watershed, GreenCOM created, and for the first year managed, the youth program Guardians of the Watershed. The program combines adventure and fun with environmental education and commitment to protect the watershed. The Panama Canal Authority considered it so successful that it adopted the program. With support of the Ministry of Education, the National Administration for the Environment, and USAID, the program is to be extended to all 300 primary schools in the watershed. Another program developed with USAID support involves students in monitoring water quality.

GreenCOM helped three targeted municipalities in the watershed develop strategic, environmental, and financial plans to improve land management in the watershed. Because NGOs are central to civil society participation in watershed protection, GreenCOM supported a federation of 21 NGOs and is providing training and technical assistance to 10 of them.

With technical assistance from GreenCOM, Panama adopted an Inter-Institutional Commission for the Canal Watershed that developed its first action plan, initiated interagency agreements, began developing its financial planning capacity, and took steps to establish a data center. The Canal Watershed Monitoring Program, spearheaded by USAID with technical support from the Smithsonian Tropical Research Institute, has been incorporated into Panamanian institutions.

Businesses are preparing to comply with the new laws and regulations on water pollution and watershed protection. The private sector is also working to protect the watershed by increasing ecotourism. This growing sector is a sustainable economic alternative to traditional resource uses. In the last three years, local NGOs and agencies have dramatically increased ecotourism offerings into the national parks and the watershed. One successful program offers day-long excursions into the indigenous Embera community in Chagres National Park. Tourists receive polished educational materials in English and Spanish to sensitize them to environmental protection issues in these areas.

USAID expects to support the establishment and strengthening of water-sector institutions, improve water quantity and quality indicators, promote legal and policy reform.

- In Africa and Asia, the Trade and Development Agency allocated $4 million in FY 2002 for water activities. Ekiti State, Nigeria, recently received a $360,000 agency grant to study the technical, financial, economic, and environmental aspects of expanding the state's potable water infrastructure. Improving Nigeria's water safety should decrease the number of waterborne illnesses. The Agency also sponsored a regional Asian meeting, Partnering for Clean Water, and plans to offer grants to selected municipalities and special purpose corporations with priority water projects.
- In the Souss-Massa region of southern Morocco, USAID's program to improve water resources management includes technical assistance to develop policies that encourage efficient water use; technical assistance and training to improve planning and decision-making; pilot projects to demonstrate water management technologies for agriculture that reduce erosion within the watershed, and for industry and homes; and technical assistance and training to increase decentralization and private-sector involvement in water management.
- In India, USAID has promoted development of domestic capital markets through the Indo-USAID Financial Institutions Reform Expansion project. Using several different approaches, the project helped by: 1) supporting the Housing and Urban Development

Corporation of India's borrowing of $10 million in the U.S. capital market. It did so under the USAID-backed Urban and Environmental credit program to fund water and sanitation projects in the cities of Surat and Nagpur, benefiting nearly 1 million urban poor; 2) assisting the city of Ahmedabad's direct issuance of 25 million rupees in municipal bonds without any Indian government guarantee to secure financing from local investors for water and sanitation improvements benefiting more than 3.2 million people; and 3) working with the city of Tiruppur in developing the first public–private partnership to build, operate, and turn over water supply, distribution, and sanitary treatment facilities.

Natural Resource Management

Natural resource management, centering on freshwater, is often carried out with an integrated approach utilizing partnerships. An interesting case is the GreenCOM program in Panama, where the use of public information and communications campaigns are enabling students, the media, and communities to take greater care of their unique resource endowment.

USAID and numerous public and private partners are providing funds and expertise to improve watershed and hillside management in Jamaica. Technical assistance helps local NGOs with community-based projects in water and sanitation, soil conservation, and waste management in the Great River Watershed. Private-sector entities, NGOs, and community-based organizations are being trained to sample and monitor water quality. The project also includes environmental audits, community education, and environmental management policy change work.

The U.S. Department of State has funded UNDP's Transboundary River Basin Initiative to support regional efforts to manage shared waters. Work is underway in several basins, including teh Mekong, Nile, Okavango, Rio Frio, and Sengal. Activities are carried out in concert with other local, national, and global institutions, including the World Bank, the African Development Bank, the UN, and the large bilateral aid donors.

In Guatemala, USAID support of $3.7 million in FY 2002 helped create the 1.6 million hectare Maya Biosphere Reserve. The reserve protects Central America's largest freshwater wetland and contains most of the Maya Forest, which extends into Belize and Mexico. This USAID–Bank of Guatemala debt-for-nature exchange balances conservation with the economic needs of local communities. It promotes alternative income generation—such as eco-tourism and harvesting non-timber forest products—and involves communities in developing laws and policies that increase incentives for sustainable land use and biological diversity conservation. The program has increased the number of people using sustainable agricultural practices in the reserve's multiple-use zone. Local and national stakeholders, decisionmakers, and government entities are safeguarding biological resources in the reserve, according to environmental policy assessments that show increased environmental awareness.

Economic Development and Food Security

The ability to feed the world's growing population will be severely challenged

in coming decades by competition over increasingly limited water resources. To achieve global food security, water shortages must not turn into food shortages for the world's poor. This will require effective water resources management, food policy reform, and development of cultivars and management techniques that provide the most "crop per drop."

Collaborative Research Support Programs, operated by U.S. land grant universities with USAID support, complement international research by engaging U.S. and developing-country scientists in research that benefits countries facing environmental challenges, including food security and water resources. These programs promote erosion and nutrient control and water quality monitoring to safeguard aquatic environments and groundwater from nutrients and pesticides. The programs include research on high-value food products (such as livestock, fish, and crops) in developing countries, and implementation of best management practices to ensure sustainable production with minimal damage to the environment. Of the nearly $26 million obligated to collaborative research projects in FY 2000, $2.6 million went to fisheries and aquacultures. Some $3 million went to watershed management and integrated water resource management, of which $2.25 million funded sustainable agriculture and natural resource management. The Collaborative Research Support Programs obligation for FY 2002 is $55 million.

Disaster Preparedness

USAID funds emergency relief and transition efforts in response to man-made and natural disasters. Human exploitation of natural resources weakens the ability of natural systems to mitigate weather-related events. That puts more people at increased risk and makes ecosystems and water resources more vulnerable. The dual forces of climate variability and poor management choices about land and water resources cause natural disasters. Poor planning and preparation exacerbate damage. Because prevention of complex emergencies is far better than helping victims afterwards, the U.S. Government funds programs to teach prevention, increase local skills to respond when disaster strikes, and improve partner nations' capacity to prepare and plan to mitigate the effect of water-related and other disasters.

USAID's 2000–2004 assistance strategy to the Caribbean is reflected both in its five-year $30 million Caribbean Regional Program and in its $8.6 million assistance program for infrastructure damage following Hurricanes George and Lenny. The Caribbean initiative was developed with regional institutions, NGOs, and the private sector to support broad-based sustainable growth. USAID provides technical and financial assistance to improve disaster preparedness in this hurricane-prone region. The program centers on objectives meeting the critical needs of vulnerable groups in emergencies and help at-risk countries adopt mitigation measures.

USAID and NOAA are providing snow-monitoring and river-forecasting assistance to Central Asian Hydrometeorological Services, known as Glavgidromets. A high-resolution picture terminal will track NOAA polar-orbiting satellites and download imagery collected over Central Asia.

The Glavgidromets will use this imagery to monitor the snow pack in

the Himalayan Mountains, the source of most of the water that flows through the Amu Darya and Syr Darya Rivers. NOAA is also working with Glavgidromets to determine whether there are sufficient historical and real-time hydrometeorological data to undertake river forecasting in the high-altitude sub-basins for which the snow pack is the principal source of river discharge.

Training in integrated water resources management and developing the technical capacity of the Glavgidromets are important parts of this program. Planning for this project began in FY 2000; money was first obligated in FY 2001 to the republics of Kazakhstan, Kyrgyzstan, Turkmenistan, Tajikistan, and Uzbekistan.

Protecting Oceans and Coastal Resources

Marine and coastal ecosystems and the diversity of species they support provide essential benefits in the form of food, livelihood, medicine, clean air, aesthetic enjoyment, and other economic, environmental, and cultural values.

An estimated 60 percent—about 3.4 billion people—of the global population lives within 100 kilometers of a shore and relies heavily on marine habitats and resources for food, building materials, and agricultural and recreational areas. They also use coastal areas as a dumping ground for sewage, garbage, and toxic wastes, undermining future development options.

Much of the remaining non-coastal population lives along rivers and other waterways. Pollution and poor land use in these watersheds can affect downstream marine habitats when sediments and pollutants are washed into coastal waters and estuarine habitats. Estuaries, coastal wetlands (marshes and mangroves), and near-shore environments are very productive ecosystems strongly linked to productive fisheries. They are important nurseries and habitats to many commercially important fish and shellfish. The land and coastal environments are connected with the open oceans, which are linked to the world's climate. Science and technology have opened new windows into the functioning of earth's systems, through understanding of the deep oceans.

The U.S. Government supports efforts to integrate coastal and freshwater resources management, preserve aquatic biodiversity, and reduce pollution from land activities. U.S. programs support sustainable management of coral reefs, mangrove forests, seagrass meadows and fisheries, and develop and disseminate information on the protection of oceans and coastal regions. Among the many activities are development of socioeconomic and environmental indicators, systematic observation systems, watch programs, and clearinghouses, as well as capacity building and training. U.S. Government agencies, especially NOAA, maintain several comprehensive databases available to researchers and governments around the globe.

Protecting the Near Coastal Environment Through Integrated Management

During the past three decades, integrated coastal management has gained considerable global momentum as the preferred approach for sound governance to deal with issues of sustainable development in coastal areas. As the field has matured, integrated coastal management has provided leadership and developed successful approaches

addressing key development and resource management challenges across sectors and levels of government. Diligent attention to the appropriate policy framework, laws, institutions, and decisionmaking processes is necessary for successful programs.

USAID, in partnership with the University of Rhode Island's Coastal Resources Center, has been working to promote integrated coastal management since 1986. Since the launch of the Coastal Resources Management Project, USAID has worked with the governments of Indonesia, Kenya, Mexico, the Philippines, Sri Lanka, Tanzania, and Thailand to address coastal governance and environmental problems threatening future economic development. Coastal management is essentially an effort in governance, developing processes in participatory planning and environmental stewardship at national and community levels. U.S. programs work at the national and local levels with strong linkages between them. These integrated coastal management programs are also playing critical roles in the decentralization process—as in the Philippines, Indonesia, and Tanzania—by helping to establish a sound governance process for management and empowering rural communities. Local stakeholders, such as women and other marginalized groups, are also mobilized to participate in conservation efforts.

In the Pacific, the Peace Corps is active in regional, national, and community-based efforts that help protect fragile and biologically sensitive areas, promote environmental education and awareness, generate alternative sources of income through integrated conservation and development activities, and build capacity to monitor the health of native species and ecosystems. Because of the extraordinary cultural diversity, remote population centers, and unique land-tenure system throughout the Pacific, a grassroots and culturally appropriate approach to environmental conservation is essential. Peace Corps volunteers work and live in communities on some of the most remote outer islands and in urban and regional centers. They work with local and national

Indonesia: A Model of Success in a Coastal Zone Management Program

When USAID and the Government of Indonesia first agreed to include East Kalimantan's Balikpapan Bay and its watershed within a coastal resources management project, it was the first initiative in Indonesia to link coastal land and water management using a bay-centered approach. Through its focus on multisectoral interests and interconnections with the natural environment, as well as implications for future development in the area, the project now serves as a model for achieving sustainable coastal zone management in other USAID projects within Indonesia and globally.

The coastal city of Balikpapan hosts a population of about 450,000 and is growing rapidly at an above-average annual rate of 3 percent. Land use near the city and within the Bay watershed is also changing dramatically. Sixty percent of the original primary forests have been cleared (and the remainder is regularly burned), large-scale oil palm and rubber plantations established, shrimp and fish ponds developed, and new settlements built to accommodate rural development. Most of this development has occurred without regard to the ecological or aesthetic values of the Bay, home to some 56 rivers and creeks and 17,000 hectares of mangroves that provide a vital habitat to fish and birds.

Building on the residents' interest in protecting the coastal environment in Balikpapan, USAID is helping guide them through a process of governance reform whereby communities can engage in equitable and inclusive approaches to development planning. Local governments are also seizing the opportunity to devise more responsive development programs funded with an increased share of revenues retained locally under new decentralization laws. This is the beginning of a governance reform that presumes increasingly localized management of resources will result in improved social, economic, and ecological outcomes for local communities.

government ministries and NGOs to improve management and planning skills. Volunteers thus play important roles in strengthening and sustaining national and local institutions. Peace Corps programs in the Pacific draw on the expertise of its regional institutional partners. The Peace Corps is uniquely positioned to effect broad and lasting change at levels where it will make the most difference. Currently, there are nearly 500 volunteers serving throughout the Pacific, including the Philippines, with many living in and working with coastal communities.

Coastal resources management programs promote a system of checks and balances and collaborative action within central government—key elements of successful participatory democracy. These programs have typically created interministerial commissions, usually at the presidential or prime minister-level, that come together to analyze significant coastal management issues or negotiate a common agenda, thereby setting national policy. At the local level, coastal resources management programs promote participatory democracy in a tangible way by holding public meetings, openly negotiating development priorities, and teaching conflict mediation techniques. Consensual user agreements that hold stakeholders responsible for management of coastal resources are the foundation for effective, participatory governance that creates stewardship and local accountability for maintaining ecosystem qualities.

The timing, volume, and quality of freshwater inflow into coastal environments are additional factors in coastal productivity that are often undervalued or overlooked. Successful management of water resources is clearly central to the long-term, sustainable use of coastal resources. U.S. programs seek to stimulate a more integrated approach to coastal and water resource management, especially with increasing population pressures on coastal lands and watersheds.

The link between activities in upland watersheds and the quality of coastal waters is the basis of USAID's Ridge to Reef environmental management program to protect Jamaica's prized coastal environment. The goal is to reverse environmental degradation by improving local governance and promoting environmentally sound practices and policies that will establish sustainable management of the natural resource base. Key beneficiaries are 300,000 Jamaicans—including 28,000 whose livelihoods depend on tourism—who live in the towns and watersheds near targeted tourism areas where USAID and local partners are providing assistance.

The Ridge to Reef program has contributed to improving coastal water quality around Negril and strengthening more successful NGO environmental programs. U.S. and Jamaican NGOs and smaller CBOs across Jamaica, especially in the areas of Negril, Montego Bay, Ocho Rios, and Portland, are working in solid waste management, environmental education, public awareness, water quality monitoring, community sanitation, interagency collaboration, environmentally sound agricultural production, and recycling. The Jamaican Government is developing new policies on ocean and coastal zone management, watershed management, environmental management systems, and wastewater connection and management. USAID contributed $3 million to this project for

FY 2002. A "ridge to reef" approach has been incorporated in many USAID programs throughout the Caribbean.

The EPA is helping implement a Caribbean response to land-based runoff affecting the coastal environment—the Protocol Concerning Pollution from Land-Based Sources and Activities (Aruba, 1999) to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena, 1983). The Land-Based Sources Protocol includes obligations to work to prevent, reduce, and control pollution of the wider Caribbean area. There are specific and general obligations for sewage and agricultural runoff.

Other U.S. Government efforts support coastal and marine protected area management programs. NOAA's National Ocean Service and South Africa's Marine and Coastal Management Directorate of the Department of Environmental Affairs and Tourism are developing a framework for technical assistance and collaboration, seeking to exchange and develop ideas, information, skills, research, and techniques in marine protected area management, and to develop guidelines for such areas in South Africa. The first phase of this exchange program introduced South African area managers and administrators to the well-developed and coordinated National Marine Sanctuary Program in the United States. On-site training visits focused on developing and implementing management, monitoring, enforcement, and education and outreach programs. The program also includes advice on forming advisory councils and promoting citizen participation, fundraising strategies, and conducting workshops on site. USAID contributed $145,000 toward this project and is also supporting over 10 marine protected areas of international or national significance.

The long-term success of marine protected areas depends on establishing evidence that they are a useful conservation tool. NOAA's National Ocean Service, World Commission on Protected Areas, and World Wildlife Fund International have launched an initiative to design an internationally-recognized methodology for assessing the effectiveness of marine protected areas. The initiative seeks to improve area management by giving managers, planners, and other decisionmakers methods to assess the effectiveness of sites and of national marine protected area systems.

NOAA is also involved in developing and executing eight cooperative Global Environment Facility-financed large marine ecosystem projects. There are large marine ecosystem projects under way in 60 developing countries and eight more projects are under development. NOAA has developed a five-pronged approach to these projects including productivity, fisheries, pollution and ecosystem health, socioeconomics, and governance.

Protecting Coral Reefs

Coral reefs play a major role in the environment and economies of many countries and island states. Coral reefs are valuable for fisheries, recreation, tourism, and coastal protection. Over one billion people in Asia depend upon coral reef habitat for their primary source of protein. In addition, reefs are one of the largest global storehouses of marine biodiversity with significant untapped genetic resources. Some estimates of the global cost of losing coral reefs run in the hundreds of billions of dollars each year. The last few years

have seen unprecedented decline in the health of coral reefs and tropical coasts. Half of the world's coastal wetlands and 25 percent of coral reefs have now perished. Unsustainable management of coral reefs is undermining economic options and decreasing food security.

A partnership among the United States, other national governments, and NGOs established the International Coral Reef Initiative in 1995. The initiative mobilizes governments and stakeholders to improve management practices and share information on the threats to and health of coral reef ecosystems. USAID is working on coral reef and mangrove forest projects in 30 countries.

The U.S. Department of State also has coral reef protection programs. For example, it provides funding for technical support for the Palau International Coral Reef Center, and assists efforts to strengthen marine reserves and promote and protect sustainable fisheries and marine biodiversity.

NOAA supports the Center for Coastal Monitoring and Assessment, which conducts research monitoring, surveys, and assessments of coastal environmental quality. Using satellite data, the assessment's coral reef team is developing techniques to assess environmental change and determine water quality patterns and broad trends in the condition of coral reef habitats. The teams are improving methods for merging satellite and aircraft data. They are working with NASA to develop a global map of shallow water environments in the tropical ocean.

NOAA's National Marine Fisheries Service is promoting long-term sustainable use and conservation of marine resources, including coral reefs in the eastern Caribbean. This is being accomplished by identifying data sets for coral reefs in the region to develop an information database; training regional personnel in data collection, data management, and global information system techniques; assessing communities dependent on reef habitats at existing and candidate fishery reserve sites; and developing pilot projects to demonstrate the effectiveness of this scientifically quantitative approach for establishing marine fisheries reserves to best benefit the eastern Caribbean region.

Supporting Sustainable Fisheries

The United States cooperates in implementing fisheries agreements, including the four International Plans of Action adopted under FAO auspices in 1999 and 2001 to address fishing capacity, sharks, seabird by-catch and illegal, unregulated, and unreported fishing. The U.S. Government also supports efforts to protect and conserve endangered species of sea turtles, as a party to the Inter-American Sea Turtle Convention and as a signatory to the Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and Southeast Asia.

The State Department is also supporting sustainable fisheries (nearly $1 million for FY 2002) through demonstration projects of national programs to protect the marine environment from land-based activities and implementation of the international plan to prevent, deter, and eliminate illegal, unreported, and unregulated fishing. It also supports the Asia Pacific Economic Cooperation's Fisheries Leadership Initiative, and an East Africa fisheries enforcement workshop.

The Peace Corps has been actively assisting Zambia's Department of Fisheries to achieve its goal of improving the quality and quantity of fish-culture activities, increase the capacity of farmers and Department of Fisheries to manage integrated pond systems and provide quality extension services so that there will be continued increases in the production, yield, and profitability of fish culture.

Through the Sustainable Fisheries Initiative, NOAA's National Ocean Service, with Department of State funding, is linking marine protected areas and fisheries programs in regional networks focused on "no-take" marine reserves. In FY 2002, regional workshops are being held in the Caribbean and Southeast Asia to develop regional marine protected area networks based on partnerships with regional and national experts, and to develop regional action plans.

Observing the Open Ocean

Open ocean marine environments not only offer resources and benefits, they are intrinsically linked to the entire earth system in heat distribution, carbon storage, atmospheric gas regulation, and nutrient cycling. Learning about those connections and interactions through science and technology, data gathering, management, and information sharing provides insights into understanding and predicting natural and human-induced variabilities. Because ocean processes know no national boundaries and many of the problems are ubiquitous, it is often prudent to coordinate local and regional operational or research programs and run them cooperatively. Many of the ocean programs the U.S. supports are coordinated with and support international initiatives.

Making oceanographic data available internationally is an important role of NOAA data centers, such as the National Oceanographic Data Center, a national repository and dissemination facility for global environmental data. The data archives are a record of the earth's changing environment and support numerous research and operational applications. The centers provide data products and services to scientists, engineers, resource managers, policymakers, and others around the world. A large percentage of the center's oceanographic data is of foreign origin, acquired through direct bilateral exchanges with other countries and through the World Data Center for Oceanography, operated by the center under the auspices of the U.S. National Academy of Sciences.

The center also provides data management support for major ocean science projects such as World Ocean Circulation Experiment and the Tropical Ocean-Global Atmosphere project.

International oceanographic research and observation systems are furthered by U.S. Government programs. For instance, even with the field component complete, NSF, NASA, NOAA, the Office of Naval Research, and the Department of Energy are supporting U.S. participation in the World Ocean Circulation Experiment. The experiment is a key element of the U.S. effort in global climate change research and of the World Climate Research Programme (with more than 175 participating countries). The experiment's goals are to understand the general circulation of the ocean well enough to be able to model its present state and predict its evolution in relation to long-term changes in the atmosphere. Global climate system models will require such an oceanographic component.

Although the Tropical Ocean and Global Atmosphere Program is completed, data from the program's buoys continue to provide data daily to scientists, decisionmakers, and the public. The data comes from some 70 buoys moored in the tropical Pacific Ocean, telemetering oceanographic and meteorological data to shore in real-time via the Argos satellite system. The program established the basis for prediction of the onset of El Niño and the associated El Niño-Southern Oscillation (ENSO). The ENSO phenomenon originates in the tropical Pacific but has global ramifications into the mid-latitudes. The buoys are a major component of the El Niño–Southern Oscillation (ENSO) Observing System. Support is provided primarily by the United States, Japan, and France.

The United States plays a significant role in many marine-related international organizations, including the Intergovernmental Oceanographic Commission, World Weather Watch, Earth Watch, International Mussel Watch, International Council for the Exploration of the Sea, and the North Pacific Marine Science Organization.

The United States has helped launch multinational initiatives, including the International Research Institute for Climate Prediction. The institute is an innovative entity working to help societies adapt to climate fluctuations through the use of scientific information and tools, including global forecasts for precipitation and temperature. Forecasts are prepared monthly for Asia, Africa, Europe, and now for Afghanistan and surrounding countries. The institute facilitates a global network of collaborative projects and activities that include 1) research on climate prediction and model development; 2) generation and dissemination of climate forecasts, monitoring, and interpretive products as well as a net assessment in collaboration with forecasters at several institutions; 3) applications research and development; and 4) training and capacity building. The institute is located at Columbia University's Lamont Doherty Earth Observatory in New York, but has an international mandate realized through partnerships with international, regional, national, state, and local organizations throughout the world.

Stemming Agricultural and Land Degradation

Land degradation takes a number of forms—depletion of soil nutrients, salinization, agrochemical pollution, soil erosion, vegetative degradation from overgrazing, and forest cutting for farmland. All these reduce the productive capacity of land. According to scientists at the International Food Policy Research Institute, nearly 40 percent of the world's agricultural land is seriously degraded: almost 75 percent of cropland in Central America, 20 percent in Africa (mostly pasture), and 11 percent in Asia. The economic and social effects of this degradation are much more significant in developing countries than in industrialized countries.

Promoting Sustainable Land Use

The United States is committed to promoting sustainable land use by addressing land degradation through its international sustainable development initiatives. It provides assistance to developing countries to help them implement activities in support of the National Action Plans for the UN Convention to Combat Desertification, which entered into force in early 2001 and was signed

by the United States in 1994. While just 3 percent of the initiatives surveyed focus primarily on land degradation, nearly a quarter of them of have components that address the problem.

NASA contracted with the Earth Satellite Corporation to produce the first high-resolution global data sets of the Earth. Higher resolution data allow users in disciplines ranging from biodiversity studies to urban planning to see and understand land cover and changes in land cover at scales far more relevant to land managers. Combined with NASA-contracted global data sets of images from the last 30 years, the U.S. Geological Survey Landsat imagery will provide critical baseline information about land cover around the world and allow for detection of land cover changes.

The United States participates in the international exchange of scientific personnel for education, training, and cooperative efforts in sustainable agricultural and forestry in developing countries. It also provides international scientific, technical, and educational assistance on a wide array of issues. USAID has supported sustainable practices through the International Agriculture Research Centers, which receive funding through the Consultative Group on International Agriculture Research. The United States also has worked with the FAO on programs that promote sustainable agricultural and forestry. USAID is committed to increase its assistance in agriculture in FY 2003 by 25 percent over FY 2002.

U.S. Government initiatives promoting sustainable land use practice include the following:

- The African Sustainable Tree Crops Project is supported by the U.S. Geological Survey with input from international and local African agribusiness firms, international industry and trade groups, associations, and other U.S. agencies and donors. It builds capacity to increase tree productivity and quality, enhance environmental quality, and improve socioeconomic return for small landholders. Tools provided help producers improve degraded land, product quality, and market efficiency; enhance and protect biodiversity; and conserve resources. This project focuses on cocoa and cashew crops in West Africa (Cameroon, Côte d'Ivoire, Ghana, Guinea, and Nigeria), and on coffee in East Africa (Burundi, Ethiopia, Kenya, Rwanda, Tanzania, and Uganda).
- The U.S.–South African Binational Commission has included cooperation on land degradation issues since 1994. The United States participates through its Natural Resources Conservation Service. Since 1995, the service has hosted government leaders and technical experts from South Africa, giving them exposure to the service's planning process, policy development, organizational structure, partnerships, technology and technology support infrastructure, and technical assistance to land users and owners. The Conservation Service is also sending scientists to South Africa to assess conservation information needs for underserved populations. They will help South Africa develop a Sustainable Use of Resources Technical Guide, study land support needs, and make recommendations for action.
- The Guinean government's agri-

cultural development plan, combining control of land degradation, income production, and forest conservation, was supported by a USAID natural resource management initiative.

Preserving Forests

Forests are critical to sustainable development because of the renewable resources they contain and the environmental services they provide. Forest ecosystems provide food, medicine, timber, fuelwood, drinking and irrigation water, fodder, non-timber products, and genetic resources. They remove air pollutants and emit oxygen, cycle nutrients, provide human and wildlife habitat, maintain watershed functions and biodiversity, sequester atmospheric carbon, provide employment, regulate climate, and help build and protect soil against erosion. Notwithstanding, the World Resources Institute estimates that more than 130,000 square kilometers of tropical forests are cut down each year, and that in developing countries, forest area has declined by almost 10 percent since 1980. Globally, the net forest area continues to decline by 9.4 million hectares per year.

More than 1.6 billion people depend on forests for their livelihood, and many developing countries rely on timber and other forest products for export earnings. Loss of forests through land conversion, fragmentation, and degradation undermines investments in social and economic development. Loss of upland forests can result in flash flooding and destruction of downstream infrastructure, decline in surface and groundwater quality, and topsoil and nutrient loss that can limit agricultural production. Illegal logging degrades forest ecosystems while generating funds for rebel and illicit activities. Logging and mining roads lead the way to open up intact forests to settlement and increased hunting, poaching, fires, and exposure of flora and fauna to pest outbreaks and invasive species. Forest destruction can result in the loss of

Sustainable Natural Resource Management Practices in Guinea

In 1998, the Guinean government began a seven-year agricultural development plan to ensure food security, improve farm productivity, promote natural resource management, and reduce poverty. USAID launched a natural resource management initiative the same year, integrating local capacity building, sustainable agricultural production, and off-farm income generation.

With USAID's assistance ($14 million in FY 2002), the Government of Guinea transferred control of three state-owned forests totaling over 50,000 hectares. Local communities and the government's Forest Service co-manage the forests, according to agreed management plans that are based on accurate maps and forest inventories. Villagers are restoring forest cover, protecting watersheds, rehabilitating degraded areas, instituting agroforestry, and implementing fire control measures. The Peace Corps partners with USAID to assist communities with agroforestry and environmental education. Beneficiaries include small-scale farmers, micro and small entrepreneurs, and traders. The initiative contains a strong emphasis on women, owing to their key role in the rural economy and household food security.

USAID helps farmers increase the productivity of food, tree crops, and other cash crops through sustainable agriculture, and offers training and technical assistance in expanding off-farm small enterprise. Building these opportunities reduces the demand for farmland, relieves pressure on the fragile natural resource base, and provides additional income. For example, protection of chimpanzee populations and habitats is also a means of promoting nature tourism and generating income. USAID also provides policy-level support to legally empower communities to manage their natural resources and make the long-term investments necessary to conserve natural resources for future generations. Small landholders, small and microentrepreneurs (70 percent women), and, to a lesser extent, refugees from Sierra Leone and Liberia, are the program's ultimate beneficiaries.

commercially marketed forest products and can also increase pressure on scarce forest resources to meet increasing human demands. Local conflicts can arise from competition over scarce resources because of inequitable distribution or a lack of access. For many, forests also have important religious and spiritual significance.

The U.S. Government is working toward a sustainable future by helping find common solutions to the environmental, social, and economic challenges of deforestation. It is moving to engage the private sector more, accentuating forest certification, and promoting more environmentally sound logging practices, such as reduced impact harvesting.

The United States is active in a wide variety of intergovernmental agreements, organizations, and initiatives that undertake forest work and policy discussions. Key among them is the UN Forum on Forests, established in 2000, which builds on the work of the Intergovernmental Forum on Forests and the Intergovernmental Panel on Forests, and is intended to facilitate coordinated international action on forests.

With an annual program portfolio of approximately $85 million in forests and related program areas, including biodiversity, the U.S. Government provides substantial bilateral technical and financial assistance on forest-related development. U.S. legislation mandates that USAID include tropical forests and conservation of biological diversity as priority development goals. For more than a decade, USAID and USDA's Forest Service have worked closely to promote sustainable forest management and conservation. These projects are undertaken in partnership with local and U.S.-based NGOs, national and international research institutions, and host-country agencies. They support a range of activities in forest protection, policy formulation, training and institution building, watershed and related land-use management, natural forest management, park and wildlife management, forest regeneration, production of fuel wood, fire prevention, and species inventory and research.

U.S. Government agencies support or implement forest-related initiatives in 47 countries worldwide, working in various ways to promote conservation and sustainable management of the world's forests.

Promoting Collaborative Research, Scientific Exchange, and Training

Collaborative research, scientific exchange, and training play an important role in U.S. forest conservation programs. For instance, NASA works with other space agencies to improve remote sensing for forest inventory, assessment and monitoring in general, and for fire detection, management, and suppression. NASA supports the international Global Observation of Forest Cover program by funding forest mapping and monitoring as well as studies on carbon dynamics in forest systems. It also supports research with Brazil's Large Scale Biosphere-Atmosphere Experiment in Amazonia, led by the Ministry of Science and Technology and its National Institute for Space Research.

In the Amazon, USDA's Forest Service links field research, training, and technical assistance to sustainable forestry practices, particularly reduced-impact timber harvesting. A strong partnership with the Tropical Forest Foundation

focused on training forest practitioners, managers, and decisionmakers in sustainable forestry practices, strengthens the Foundation to undertake tropical silviculture and other conservation studies. Implemented by the Forest Service's International Institute of Tropical Forestry, another collaborative research project in the Tapajos National Forest focuses on generating new knowledge on the effects of selective timber harvesting in tropical forests and disseminating and using this knowledge to promote sustainable forest management for timber across the Amazon. USAID capitalizes on a growing demand for certified forests by supporting creation of a permanent forest-management training center that will manage an estimated 2 million hectares of certified forests in the Brazilian Amazon by 2003. USAID training and reduced-impact management models helped four Amazon timber producers respond to market demand by having 280,000 hectares of forest holdings independently certified.

USDA's Forest Service helped organize a conference and publish proceedings on the ecology and management of Korean pine forests, the most valuable tree species in the Russian Far East. More than 150 Russian foresters attended sessions by American scientists and forest regeneration specialists. The Forest Service collaborates with the Zvenigorod Moscow State University Biological Station in studying weather variability influences on sub-boreal forest plants. The service also supports long-term research on the effects of forest fires on carbon cycling, emissions, and forest sustainability. Partners include the Canadian Forest Service, the Siberian Branch of the Russian Academy of Science in Novosibirsk, and the Sukachev Institute of Forests in Krasnoyarsk. NASA funds this research,

Bolivia Sustainable Forestry Management Project and the Amazonian Center for Sustainable Forest Enterprise

With nearly a million hectares of natural forests independently certified as economically, ecologically, and socially well managed, and with more than 6 million hectares of forest under approved forest management plans, Bolivia is the global leader in sustainable tropical forestry. Yet this economically poor, resource-rich country has been plagued by extensive and largely uncontrolled deforestation by private companies that harvest only a few highly valuable tree species—especially mahogany and cedar—almost driving the species to commercial extinction.

In 1993, the governments of Bolivia and the United States established the Bolivia Sustainable Forest Management Project. To date, USAID has invested over $20 million. By working closely with government, the private sector, universities, and civil society, the Bolivian project has catalyzed dramatic improvements in forest management. With its support, in 1996 the Ministry of Sustainable Development established a new Bolivian forestry law based on greater transparency, more technically and financially independent government institutions, greater civil society and municipal government participation, and a voluntary certification program based on the Forest Stewardship Council model. At the municipal level, the project has directly supported municipal governments in their efforts to create forestry reserves and manage them through local community groups. In 2001, the first 12 local community groups were officially presented with forest concessions. With the project's assistance, four such groups have entered into strategic alliances with the forestry industry to sell their products.

Despite these achievements, Bolivia continues to experience competitive problems in producing and selling environmentally friendly or certified wood products internationally. In response, in 2000 USAID and the Bolivian Chamber of Forest Industries created the Amazonian Center for Sustainable Forest Enterprise in partnership with the World Wildlife Fund and USDA's Forest Service. The center works to support communities and the private sector with production processes, product development, and market promotion by linking buyers and sellers of certified wood and providing business development assistance to private companies. Since the program began, the value of certified forest products exported from Bolivia rose from $8.5 million (10 percent of exports) in 2000 to $13 million (25 percent of exports) in 2001.

with added financial and technical support from the Forest Service.

Reforming Policies and Strengthening Regulatory Structures

Policy, regulatory, and legislative issues set the stage for development of sustainable forestry. Bolivia's leadership in this area is notable. Supported by U.S. initiatives, Bolivia's programs are a text book case of moving from sound law to sound implementation.

Improving Forest Management Practices

The U.S. Fish and Wildlife Service supports forest habitat and species management programs in Latin America and the Caribbean. It operates training programs for managers of protected areas under the Reserve Manager Training Program, as well as graduate-level training, regional outreach institutes, and clearinghouses for information on biodiversity and habitat management in Latin America. The National Park Service trains park managers in several countries.

In southern Africa, protected area management and transboundary conservation have become priorities for environmental and political reasons. Politicians are turning to these approaches to bring peace to the region, while environmentalists want to protect large ecosystems and watersheds that cross political boundaries from further degradation. USDA's Forest Service is working with the University of Natal in South Africa and the University of Montana to develop a protected area management program that will cover management skills and approaches. The partners are developing short technical courses for protected area managers, complementing the academic program by promoting capacity-building opportunities for the practitioner.

Central Africa, with its warfare and intertribal conflict, is politically more difficult. But the countries of the region face the common challenge of better managing the region's rich forest resources. There, the United States is leading a major effort to better manage one of the world's great tropical forestry endowments.

Central African Regional Program for the Environment

Launched in 1995, the Central African Regional Program for the Environment promotes conservation and sustainable management of the Congo Basin rainforest—the second largest remaining tract of tropical rainforest in the world. A USAID initiative, the program includes a host of U.S. Government agencies, U.S. and international NGOs, and academic institutions.

These groups collaborate with a range of partners—including African NGO conservation organizations, private logging companies, government wildlife and forestry representatives, research and educational organizations—to evaluate threats to the forests and identify opportunities to sustainably manage them. Participating countries are Burundi, Cameroon, the Central African Republic, the Democratic Republic of Congo, Equatorial Guinea, Gabon, the Republic of Congo, Rwanda, and São Tome and Principe. The program addresses national policy, logging concessions, development of minor forest products, wildlife habitat monitoring, and restoration. U.S. technical expertise offers strategies for improving forest management, such as reduced-impact logging, forest planning, and monitoring techniques.

USAID has provided more than $25 million and the Department of State recently allocated $1 million to the program. The program has invested in information-gathering on protected areas and has made a significant contribution to managing protected areas. The partners have been particularly successful in gathering information on forest exploitation in Cameroon and Gabon. The program reviewed environmental and forest-sector legislation and held a high-level conference on conservation after the war in the Democratic Republic of Congo. The program also worked closely with logging companies there to engender responsible approaches to biodiversity conservation. The program has also monitored deforestation by remote sensing and offered training in biodiversity inventory to measure deforestation and biodiversity loss.

In Madagascar, USAID worked with USDA's Forest Service to develop a long-term forest strategy. Forest Service professionals spent time in-country with USAID partners to prepare a management planning process for natural forest stands, develop a plan for forest cultivation and care, and an economic analysis tool for plantation management.

Supporting Good Governance and Reinforcing the Rights of Communities

Several natural resource management programs—in Egypt, Indonesia, Nepal, the Philippines, and elsewhere—have developed model community-based approaches to forest management and biodiversity conservation that have halted deforestation while contributing to local livelihoods.

The Peace Corps, with USAID support, has more than 900 volunteers in 40 countries dedicated to natural resource projects, including community reforestation, nursery development, agroforestry, park management, and environmental education.

In Indonesia, USAID has been partnering with NGOs to support community-based forest management. USAID offered NGOs training in oversight, management, human resources, and finances. USAID's NGO partners have been very successful in achieving local recognition for community forests through such tools as community mapping. In West Kalimantan, the local government recognized the communities' rights to forests after community mapping. The communities then protected their forests from fires while an adjacent timber concession burned. Community mapping has also facilitated adoption of community-managed zones in Lore Lindu National Park. A formal decree awarded indigenous people the right to remain and control their traditional lands in the park. They have been effective in keeping out illegal loggers and poachers.

Seeking Alternatives to Forest Extraction

Ecotourism can provide alternative income for countries and people dependent on forested areas for their livelihoods. USDA's Forest Service helped the Chinese State Forestry Administration plan ecotourism in southwestern China as an alternative to commercial logging, banned in 1998. The Forest Service also helped develop an ecotourism brochure for the northwest region of Yunnan and a workshop on regional ecotourism planning in Sichuan Province.

In Albania, the Forest Service provided training in marketing for nontimber forest products. In 1999, it led a three-week training program for Albanian business owners working with botanical and medicinal plants and wild mushrooms. The goal was to improve the economic and environmental sustainability of nontimber enterprises.

Training addressed effective marketing, developing products and markets, and business management, including using the Internet for marketing and market research. It exposed participants to marketing concepts, environmental sustainability, and marketing practices of small U.S. firms and organizations. The training also provided opportunities to make contacts with U.S. firms, resulting in two budding partnerships. The Forest Service is continuing to work with Albanian counterparts on sustainability of nontimber forest products. ■

Concluding Note

This overview of sustainable development initiatives assisted by the U.S. Government represents an extraordinary range and depth of commitment. The great majority of programs and projects are part of longer term initiatives and strategies in critically important areas such as building human capital, understanding and managing climate change, and preserving biodiversity. This survey is the first such compilation for the U.S. Government. While not a complete inventory, it is nevertheless a significant sampling of initiatives totaling billions of dollars of annual governmental and partner commitments.

The World Summit on Sustainable Development is an opportunity to reinforce consensus on what needs to be done to achieve a more sustainable world. The United States intends to continue its programs and partnerships that mobilize the talent and financial resources to achieve this aim. U.S. programs, like the summit itself, will strive to promote social and economic growth that can be sustained over the long term. Good sense and morality unite to motivate this strategy. Thus, the test of the Johannesburg World Summit for Sustainable Development is whether momentum can be maintained, and even accelerated. ■

Attachments

Survey Methodology

At the request of President Bush, USAID conducted a survey of U.S. Government departments and agencies, requesting information on sustainable development activities receiving current (FY 2002) financial support. Survey responses were then sorted in many different ways. USAID selected 400 cases to analyze as a major sampling of U.S. activities. The survey is not a complete inventory—many more activities are underway in some sectors than were recorded through the survey. In many instances, a single activity (counted just once) consists of separate commitments to a great many countries. The research team that compiled this report relied quite considerably on the survey data. The team also gathered information from published reports and discussions. Many agencies and departments filled in data gaps not covered in the survey results. Despite shortcomings in collection and comprehensiveness, the information from the survey is considered generally representative of the main sectors and activities of sustainable development receiving U.S. Government support. The survey results are presented in full on the
CD-ROM accompanying the summary report so readers can learn more about individual initiatives.

The survey statistics appearing throughout this report are derived from information reported in the approximately 400 surveys submitted by June 30, 2002. Any surveys submitted after this date appear in the database but were not used in the tabulations for the report. One survey equals one U.S. Government initiative, although, as noted above, in many cases one initiative is composed of numerous activities and programs. The survey asked U.S. Government agencies to indicate the major themes and sector areas of their initiatives. Agencies were offered choices between six themes—good domestic governance, private sector financing, public–private partnerships, PVO/NGO institution building/strengthening, resource stewardship, and science and technology—and 12 sectors—agriculture and food security, biodiversity, climate, education, energy, forests, freshwater, health, labor, land degradation, oceans (coastal), and transportation. From these options, they selected one primary theme and, for most initiatives, one primary sector for each initiative. In many cases, agencies also selected multiple secondary themes and sectors that indicated components of their initiatives.

Participating U.S. Departments and Agencies

Department of Agriculture
Department of Commerce
Department of Education
Department of Energy
Department of Health and Human Services
Department of Interior
Department of Justice
Department of Labor
Department of State
Department of Transportation
Department of Treasury

Agency for International Development
Environmental Protection Agency
Export-Import Bank
Federal Trade Commission
National Aeronautics and Space Administration
National Oceanic and Atmospheric Administration
National Science Foundation
Peace Corps
Small Business Administration
The Smithonian Institution
Trade and Development Agency

Photo Credits

The editors thank the many individuals, departments, and agencies who contributed photographs and artwork. Captions and credits appear after page numbers.

7	*A solar energy project in Mexico produced by a partnership.* Sandia National Laboratories, Department of Energy
9	*Reef cleanup in Indonesia.* Coastal Resources Center, University of Rhode Island
10	*Irrigating with Nile water.* World Bank Photo Library: Francis Dobbs
11	*Child labor in different parts of the world.* UN/DPI; ILO Photo Library: D. Browne, J. Maillard
12	*Voting in Indonesia.* International Foundation for Election Systems
13	*A classroom in India.* World Bank Photo Library: Curt Carnemark
17	*A billboard contributes to the HIV/AIDS campaign in Uganda.* USAID
19	*Infant being immunized in Morocco.* M/MC Photoshare: Lauren Goodsmith
21	*The Caspian Sea.* Reza/Webistan
23	*Outlining community forest management in Namibia.* USAID
25	*Domestic shelter and municipal water in South Africa.* USAID
28	*Russian non-timber forest products at a trade show in Hong Kong.* USAID
32	*An insecticide-treated bednet.* USAID: S. Colvey
39	*Potable water in Zimbabwe.* World Bank Photo Library: Curt Carnemark
41	*A protected forest in Honduras.* USAID: Jerry Bauer
44	*A hunter in Barrow, Alaska.* Don Schell
45	*Tracking El Niño.* NOAA/Pacific Marine Environmental Laboratory, Seattle: M. Neimer
47	*Power plant compressor.* Department of Energy
48	*Traffic congestion.* World Bank Photo Library: Curt Carnemark
49	*Electricity supply towers.* USAID
52	*"Green" products in the Meso-American Biological Corridor.* USAID
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58	*Sign in a national park in the Panama Canal Watershed.* Academy for Educational Development/GreenCOM/Panama
62	*Volunteer monitoring in the Blongko Marine Sanctuary.* Coastal Resources Center, University of Rhode Island
69	*Young people committed to reforestation and fire prevention in Guinea.* USAID/Guinea: Laura Lartigue
71	*Certified forests in Bolivia.* USAID
72	*The Congo Basin rainforest.* USAID
74	*Port Honduras Marine Reserve in southern Belize.* USAID: Scott Lampman
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Question 15. The United States, with other nations, has subscribed to the UN's Millennium Development Goals on the alleviation of poverty, access to safe drinking water, health and education, etc. But in the preparatory meetings leading up to WSSD, the United States has been isolated in remaining resolutely opposed to international efforts to set out how these Millennium Development Goals are to be achieved. Why is there a gap. between rhetoric and reality?

Response. The United States strongly supports efforts to implement the internationally agreed Millennium Development goals. In our view, based on our 60 years of development experience, partnerships are the most effective way to implement those goals. The United States has taken the lead in pursuing partnerships and pushing this effort forward. We hope that other countries will join us in focusing on the implementation of the Millennium Development Goals. We have prepared a compendium of success stories in water and energy, for example, which details how partnerships in these sectors has led to concrete, on-the-ground results improving the lives of individuals. (Please see the attachment referred to in question 14).

We have emphasized this view throughout the preparatory process leading up to WSS]J.

Question 16. To what extent, financially or otherwise, will the U.S. Government support President Mbeki's New Economic Partnership for African Development (NEPAD)?

Response. NEPAD, the New Partnership for Africa's Development, was adopted by African heads of State in October 2001. The United States and others have welcomed NEPAD for its African origins and emphasis on good economic and political governance, including peer review and monitoring. The real test of NEPAD will be whether the bold rhetoric is reflected in concrete action and change. The objectives set out in NEPAD are consistent with the President's Compact for Development initiative, which emphasizes aid effectiveness through performance-based development assistance, accountability, measurable results, and local ownership.

In response to NEPAD, the United States and its G–8 partners developed an Action Plan for Africa in which we committed to enter into enhanced partnership, including providing additional resources, with countries whose performance reflects the NEPAD commitments. Specifically, our efforts will focus on countries that demonstrate a commitment to good governance and the rule of law, investing in their people, and pursuing policies that promote democracy, spur economic growth, and alleviate poverty.

Question 17. How effective has the NAFTA environmental side agreement the North American Agreement on Environmental Cooperation (NAAEC)—been at protecting the environment? Where could it be improved?

Response. The North American Agreement on Environmental Cooperation (NAAEC) has proven to be a useful tool for protecting the environment. Pursuant to the NAAEC, the Commission for Environmental Cooperation (CEC) was established and has evolved into an effective international environmental institution. The CEC consistently demonstrates the benefits of continental cooperation in addressing the environmental components of liberalized trade, serving as a complement to the NAFTA.

The implementation of the NAAEC has led to environmental achievements' including:

- The phase-out and reduction of toxic chemicals in North America, including DDT;
- The protection of biodiversity through the North American Bird Conservation Initiative, Species of Common Conservation Concern, North American Marine Protected Areas Network, and the bilateral U.S.-Mexico Wildlife Without Borders program; the sharing of environmental management information through the North American Biodiversity Information Network; and
- The development of micro-financing partnerships to promote pollution prevention for small and medium-sized businesses; the promotion of sustainable agricultural practices for small scale producers; and the establishment by Mexico of a Pollutant Release and Transfer Register.

The NAAEC provides members of the public with avenues for input through several advisory bodies and a public submission process. As a result, the CEC has become an important forum for cooperation, including public dialog and participation.

Over time, the CEC's cooperative work program has significantly expanded and, gained momentum in addressing a wide array of environmental issues of continental concern. At the same time, the CEC's resource base has remained constant since its inception in 1995 at $3 million from each country annually. As such, the effectiveness of this unique international environmental institution might be vastly improved by increased funding and/or more focused work on priority activities. In another area, the parties are working to strengthen communication and cooperation between trade and environment officials as envisioned in NAAEC Article 10(6), which calls for cooperation between the CEC and the NAFTA Free Trade Commission "to achieve the environmental goals and objectives of the NAFTA. . . .".

Question 18. The United States has a good record with respect to promoting the Export Credit Agencies in the Organization for Economic Cooperation and Development. Where do things stand on ECAs?

Response. The United States has led the effort to strengthen environmental guidelines for official Export Credit Agencies (ECA5), both at the G–8 and in the Organization for Economic Cooperation and Development (OECD) Working Party on Export Credits and Credit Guarantees (ECG).

We have made progress, but the current OECD proposal, "Common Approaches to the Environment", falls short of our objectives of securing a clear commitment on the part of ECAs to adhere to a minimum set of common environmental standards and credible transparency provisions, modeled on current World Bank stand-

ards. While our Export-Import Bank has had environmental guidelines since 1995, only a few of our competitors have standards that even approach the quality of Em-Im Bank's. Others in the OECD insist that ECAs focus now on implementing the "Common Approaches" that some Members said they would implement on a voluntary basis at the November 2001 meeting, and then review our respective experiences in 2003. Although we see the 2003 review as an important opportunity to apply lessons learned to strengthening and standardizing guidelines for ECAs, we do not intend to let this matter rest, and will continue to take every opportunity to make progress.

Question 19. National laws are not able to address the striking decline in the world's fishing stocks and the overall biomass of the world's oceans in that portion of the earth's surface beyond any national jurisdiction. What commitments are you prepared to make regarding the creation and enforcement of international standards to prcitect this area of the high seas from unsustainable mining activities and fishing practices, such as bottom trawling and unwanted by-catch problems that cause massive destruction of marine life?

Response. Under this Administration, the Department of State is taking a lead role in efforts to strengthen both the rules governing the conservation and management of living marine resources in areas beyond national jurisdiction, and the enforcement of those rules.

In recent years, a new international framework has been established to accomplish this goal. Much of this work has focussed on global instruments such as the U.N. Fish Stocks Agreement, the FAO Compliance A9reement and the FAO Code of Conduct for Responsible Fishing. Together, these and other recent agreements provide an effective toolbox for addressing issues such as overfishing, bycatch of non-target species, excess capacity of fishing fleets, lack of enforcement of existing rules and other problem areas.

It is now up to the United States and other countries that support the principles embodied in these agreements to work for their effective implementation at the regional and sub-regional levels through existing and newly created regional fisheries management organizations. This is not an easy task. Most international fisheries organizations operate by consensus, giving great weight to those who oppose serious efforts to effect necessary changes. However, we are committed to making every possible effort to promote sustainable fishing practices on fish stocks in areas both within and beyond national jurisdiction.

One area where much work needs to be done is the area of bycatch and discards of small fish as well as other non-target fish species and other species including sea turtles and sea birds. Bycatch of sea birds and sea turtles in commercial longline fisheries, in particular, are issues that require more international attention. Again, this is difficult in that affected fleets may oppose conservation efforts that could adversely impact their operations. Because we have limited market leverage or other ways to compel action, we must work with other nations and their fishing industries to convince rather than coerce. Industry involvement and cooperation will be vital if we are to identify and introduce the technological solutions that will be necessary to address these issues.

As part of this process, the Western Pacific Regional Fisheries Management Council, based in Honolulu, will convene this November the Second International Fishers Forum (IFF2). The conference will bring together representatives from the fishing industry, governments and the environmental and academic communities to address these and other issues. We strongly support this effort and will look carefully at the results of that meeting to identify possible next steps by Governments to mitigate sea bird and sea turtle bycatch in longline fisheries.

As to mining activities on seabed areas beyond the jurisdiction of any nation, the United States participates as an observer in the International Seabed Authority (ISA). The ISA is a body created by the United Nations Convention on the Law of the Sea, to which the United States is not yet a party. The ISA has completed Regulations on Prospecting and Exploration for Polymetallic Nodules, which include measures to protect the marine environment from mining activities. Through its role as observer, the United States has worked hard to develop measures that are consistent with U.S. interests.

Question 20. One of the significant outcomes of the Rio Earth Summit was the U.N. Framework Convention on Climate Change, which President George Herbert Walker Bush signed and which the U.S. Senate subsequently ratified unanimously in a voice vote.' The Kyoto Protocol gives effect to the objectives agreed to in the Climate Convention, and it is likely to enter into force sometime this year, perhaps at WSSD. The current Administration has said it does not support the Kyoto Protocol'. Nevertheless, the United States is still a Party to the Climate Convention.

At the hearing, Mr. Connaughton admitted that the United States has not fulfilled its commitments to report to the United Nations on policies and measures to achieve 1990 levels of emissions. What steps will the Administration take to rectify this noncompliance?

Response. The United States is in compliance with its commitments to report on its policies and measures under Article 4 of the Convention. The United States has submitted detailed information on our policies and measures, in accordance with the procedures under the Convention. Most recently, policies and measures are' detailed in the U.S. Climate Action Report, the third National Communication from. the United States to the Convention, submitted in May 2002. Concerning the non-binding "aim" of returning emissions to their 1990 levels, this aim refers to the year 2000, not the time period beyond 2000.

Question 21. Please explain how the Administration's policies on climate change are consistent with our commitments under and the spirit of the United Nations Framework Convention on Climate Change.

Response. The Framework Convention's commitments relate principally to:

- Support for research and systematic observation;
- Promotion of education, training, and public awareness;
- Various forms of cooperation among Parties;
- For Annex I Parties (which includes the United States), adoption of policies and measures on the mitigation of climate change, as well as reporting on such policies and measures;
- For Annex II Parties (which includes the United States), support for developing countries in terms of financial resources and environmentally sound technologies.

The Administration's policies implement all applicable commitments under the Convention. Most recently, the U.S. national communication, submitted in May 2002, detailed U.S. policies and measures to address climate change.

The Administration's climate change policies involve extensive cooperation with other Convention Parties, are consistent with U.S. commitments under the Convention, and are designed to be economically sustainable. They represent a significant contribution to the global effort to address climate change both under the UNFCCC and elsewhere.

- The Administration's greenhouse gas intensity goal and the measures we will be taking over the next 10 years is both ambitious and reasonable, and is in line with past administration forecasts of the domestic reductions likely to be achieved under the Kyoto Protocol, and forecasts of other countries' efforts with respect to climate change policies.
- The Administration's commitment to climate change-related research and development is unmatched in the world, and represents what is truly a unique contribution toward a longterm climate change approach that is consistent with sustainable development. The President's National climate Change Technology Initiative confirms America as the leader in technology and innovation within the climate change area. The President's fiscal year 2003 budget proposal dedicates nearly $1.8 billion to fund basic scientific research on climate change and $1.3 billion to fund research on advanced energy and carbon sequestration technologies. The Administration has substantially increased funding for climate-related technical assistance to developing countries.

Overall, the President's fiscal year 2003 budget seeks $4.5 billion in total climate spending—an increase of nearly $700 million. To the extent that there could be said to be a "spirit" of the Convention, the Administration's efforts are fully compatible with that spirit.

Question 22. In view of the recent EPA study that substantiated the fact' that global warming is occurring, and the even more recent study by Alaskan scientists published in the Washington Post on Friday, July 19, 2002 that the Alaskan glaciers are melting at over twice the rate previously supposed, and the very real national security interest that the United States has in ceasing its dependence on foreign oil, will this Administration commit at the WSSD to increase its international cooperation to reduce the generation of greenhouse gases?

Response. The Secretary General of the United Nations has outlined five priority areas for the Summit: water and sanitation, energy, health, agriculture, and biodiversity. The United States is actively pursuing concrete initiatives to the Summit that are in line with these priorities, namely on water, agriculture, health, energy, oceans and forests. Climate change is not one of the Summit's priority areas, because the U.N. Framework Convention on Climate Change serves as the internationally agreed forum for addressing climate change. The Administration is pursuing ambitious steps to address climate change domestically, and is actively engag-

ing in cooperative activities with countries around the world. For example, the President's plan seeks to continue the process of developing new technologies while nurturing the growth' of the economy. To this end, the President is creating the National Climate Change Technology Initiative, which will confirm America as the leader in technology and innovation within the climate change area. Furthermore, the President's fiscal year 2003 budget proposal dedicates $1.7 billion to fund basic scientific research on climate change and $1.3 billion to fund research on advanced energy and sequestration technologies. Overall, the President's fiscal year 2003 budget seeks $4.5 billion in total climate spending—an increase of nearly $700 million. This level of commitment is unmatched in the world.

Question 23. Has the United States or its representatives, officially or unofficially, discouraged countries from bringing climate change initiatives or issues to the World Summit for consideration?

Response. The United States has not discouraged countries from bringing climate change initiatives or issues to the World Summit on Sustainable Development. The United States delegation has engaged constructively on a substantial amount of text on a variety of climate change issues occurring in the Plan of Implementation. Most of the climate change-related text in the draft Plan of Implementation has been agreed.

Several delegations have put forward textual proposals that have the effect of asking the United States to endorse the Kyoto Protocol, or to take on new climate-related commitments in the WSSD. The United States does not support the Kyoto Protocol', and we have indicated to those delegations that we cannot support text that is contrary to our national position. The United States also has not agreed to additional climate change commitments at WSSD because the internationally agreed forum for negotiating climate change commitments is the U.N. Framework Convention on Climate Change. The Eighth Conference of the Parties to the Convention (COP–8) will take place in October 23—November 1, 2002.

Question 24. Throughout the process, many governments have complained that the United States has turned a blind ear/eye to Rio. The Secretary General thinks that recognition of the Rio Principles will be key for successful implementation in Johannesburg. How will we recognize and implement the "spirit of" the Rio Principles?

Response. We strongly support the principles of Rio, and would like to see these principles reaffirmed within the Johannesburg Plan of Action.

Question 25. What is the Administration's position on the Corporate Accountability Convention that many non-governmental organizations have called for?

Response. We strongly support efforts to promote corporate responsibility.

We believe such efforts are best accomplished at the national level through a combination of government regulations and oversight along with voluntary corporate standards and practices implemented by the public sector, elected officials, and the private sectors in respective countries, not by a new multilateral treaty negotiation.

Question 26. The President has announced that he will ask Congress for an extra $5 billion in overseas aid. Right now., the United States spends about 0.1 percent of its GDP on aid—the lowest percentage of any industrial country and below the average of 0.39 percent. Even with the increase, we'll still be the lowest in the world. Why is that?

Response. Excluding the Administration's new commitment of $5 billion for the Millennium Challenge Account, Official Development Assistance is being increased by 10 percent in fiscal year 2002. If the Administration's fiscal year 2003 budget request is approved, funding for HIV/AIDS over the past 2 years will have increased by 73 percent, funding for education will have increased by 65 percent and funds focused on Sub-Saharan Africa will have increased by 30 percent, reaching $1 billion for the first time. In our view, how funds are spent is more important than increased funding, which represents only part of solution to address sustainable development. The Administration believes that' assistance is most effective when it reinforces peace and stability, domestic governance, investments in people through health and education and private sector development.

INVESTING IN HEALTH: FIGHTING INFECTIOUS DISEASE FOR SUSTAINABLE DEVELOPMENT

KEY ACTION

The Bush Administration is building upon recent announcements of efforts to combat HIV/AIDS, tuberculosis, and malaria.

• In June, President Bush announced a new $500 million Mother-and-Child HIV Prevention Initiative for Africa and the Caribbean,

• The U.S. pledge of $500 million to the Global Fund to Fight HW/AIDS, Tuberculosis, and Malaria represents approximately one-fourth of all commitments to date.

Goal: To have, by 2015, halted, and begun to reverse, the spread of HP//AIDS, the scourge of malaria and other major diseases that afflict humanity. (United Nations Millennium Declaration)

Description: This multi-year initiative will:

• Enhance technical assistance for Global Fund application development and project implementation.

• Strengthen surveillance and monitoring, research, prevention, and care activities.

• Expand efforts to combat mother-to-child transmission of HIV/AIDS.

• Pursue global partnerships and increased investment in fighting HP//AIDS, TB, and Malaria.

Resources

U.S. resources for international HIV/AIDS, tuberculosis, and malaria, including meeting the President's pledge to the Global Fund are:

• $1.1 billion committed in fiscal year 2002

?• $1.2 billion requested for fiscal year 2003

Partners

The United States works with a wide array of partners including governments, international organizations, private corporations, foundations, faith-based groups and non-governmental organizations.

South Africa Housing Initiative

KEY ACTION

?The United States will commit $15 million in support of the construction of 90,000 homes in South Africa over the next 5 years. This initiative, announced by the United States Overseas Private Investment Corporation (OPIC), builds on a 10-year legacy of strengthening housing finance for South Africa's poor begun by the United States Agency for International Development (USAID).

Home ownership and community building are inextricably linked. According to the National Department of Housing of South Africa, one of the factors contributing to the deficit in construction of low-income housing is insufficient sources of construction financing, particularly for middle-to low-income wage earners.

Under the South Africa Housing Initiative, construction financing will be made available for contractors constructing homes for middle-to low-income families. Under this Initiative, a for-profit U.S. sponsor will work with a South African Bank which, in turn, will be able to lend the equivalent of $20 million to the NTJRCHA Equity Services (NES), a for-profit entity operating under the National Urban Housing Association (NURCHA) of South Africa.

The South Africa Housing Initiative is expected to stimulate South Africa's construction sector through loans to for-profit builders, contractors, and sub-contractors, and to efficiently expand employment, skills, and training in an essential sector of the economy of South Africa.

Over the past 10 years, USAID has underwritten $90 million in private sector loans to enable South African banks to make available $250 million in housing loans to benefit 110,000 needy households. USAID has also financed considerable urban infrastructure (water, sewers, and roads) to enable the construction of new neighborhoods. The new OPIC initiative broadens this support for the transition of middle-to low-income households to homeownership and so contributes to long-term sustainable development for South Africa. Moreover, the delivery of potable water through the construction of new homes and the establishment of new housing communities for 90,000 households and almost 500,000 South Africans will contribute to improved health and achievement of Millennium Declaration goals.

Resources

• The United States will commit $15 million in support of this important initiative.

Oceans

White Water to Blue Water. This initiative, involving U.S. Government agencies, the UK, France, and Spain, Caribbean governments, the Caribbean Environment Program, other international organizations, non-governmental organizations, and the private sector, emphasizes a cross-sectoral approach to ecosystem management beginning with upstream sectors (watersheds, inland forests, agricultural areas, and population centers) and extending through wetlands, mangrove swamps and coral

reefs into the ocean. The initiative aims to improve capabilities of coastal States to manage coastal-marine ecosystems and to promote regional coordination among the partners to make best use of resources. The initial focus will be on the Wider Caribbean region.

Geographic Information and Learning

• Geographic Information for Sustainable Development. This initiative brings together U.S. Government agencies, non-governmental organizations, the private sector, and academia to improve the quality and availability of data needed to understand better and monitor the environment. Recent applications of data from satellite earth observation systems, the Global Positioning System, Geographic Information Systems, and data base management can help decisionmakers address sustainable development problems in Africa, including food security, sustainable' agriculture, natural resource management, disaster mitigation, and poverty alleviation. More than 100 GISD-related projects are currently underway In Africa. The initiative already has funded 15 projects in the areas of Upper Niger, East African Great Lakes, Kenya-Tanzania coast, and the Limpopo-Zambezi Basin.

• My Community, Our Earth. This partnership involves partners such as the U.S. Department of Agriculture, the National Geographic Society, the Association of American Geographers, the Environmental Systems Research Institute (a geographic information system and mapping company), and the U.N. Environmental Programme. The partnership is using maps, images, and graphs to help secondary, college, and university students worldwide learn about sustainable development issues such as biodiversity, deforestation, pollution, food production, fresh water supply, health, rural development, and urbanization. It aims to increase awareness about the value of geographic information systems technology, especially satellite images. Nearly 500 volunteer mentors have registered to help over 2000 students from more than 90 countries develop projects.

Biodiversity

• Shade Coffee. This partnership helps small-to medium-scale coffee producers produce more profitable, high-quality coffees (organic, shade-grown, or "Bird Friendly" coffees), thereby promoting conservation while meeting rural development needs. The Commission for Environmental Cooperation, which is supported by the United States, Canada, and Mexico, is facilitating establishment of a North American sustainable agriculture debt facility that would make strategic credit guarantees/interventions to enhance the ability of small-scale producers groups, conservation groups, and private investors to collaborate more effectively at the local and international levels. Shade Coffee partners include the U.S. Agency for International Development (USAID), U.S. Department of the Interior, U.S. Department of Agriculture, the Smithsonian Institution's Migratory Bird Center, Conservation International, Rainforest Alliance, Specialty Coffee Association of America, and Starbucks Coffee.

• Invasive Alien Species. This initiative aims to understand the vectors and processes by which invasive alien species are introduced and to develop mechanisms for detection, rapid response, and mitigation. Partners include the governments of Australia, New Zealand, Norway, and South Africa; the Global Invasive Species Program; the U.S. Departments of Interior, Agriculture, Commerce, and State; the Environmental Protection Agency; USAID; the Smithsonian. Institution; many U.S. universities; State and local management authorities; and non-governmental organizations.

• Biological Diversity Informatics. This partnership seeks to develop and expand availability of user-friendly, internet-based access data that will allow users to link, integrate, analyze, and visualize existing data and ongoing research pertaining to species distribution. Partners include the U.S. National Invasive Species Council, Global Diversity Information Facility, Inter-American Biodiversity Information Network, North American Biodiversity Information Network, U.S. Department of the Interior, Smithsonian Institution, the Universities of California and Kansas, Conservation International, and the International Union for the Conservation of? Nature and Natural Resources.

Agriculture and Natural Resources

• Building-a Partnership for Global Exchange of Conservation Stewardship Practices. This partnership seeks to build capacity in agriculture and natural resource conservation and stewardship practices for sustainable agriculture and forest and watershed management. A worldwide network will facilitate global peer-to-peer learning and exchanges for short-term, on-the-ground, community-and watershed-based activities, such as integrated land, water and coastal management; land restoration and rehabilitation; individual and community capacity building; and enterprise development. This public/private partnership, initiated by the U.S. Department of Agriculture, will increase the application of agriculture and natural re-

source conservation practices, exchange of integrated resource management approaches, and community participation in local decisionmaking.

Principles of Sound Science in Decision-Making

• Strengthening Science-Based Decision-Making. This partnership brings together the Environmental Protection Agency, the U.S. National Academies of Science, the American Chemistry Council, and others in an effort to develop and strengthen linkages between science and decisionmakers in developing countries so that policy decisions can be based on the best available knowledge and so that research priorities can take into account the needs of decisionmakers.

Health

• Netmark: A Public-Private Partnership for Sustainable Malaria Prevention. This partnership, involving USAIr, works with country governments and the commercial private sector to promote effective use of insecticide-treated bednets for the prevention of malaria. At the heart of Netmark is an innovative use of public-sector funds to reduce and eliminate the barriers to expanded commercial investment in the manufacture and distribution of insecticide-treated bednets. Netmark activities are underway in Ghana, Nigeria, Senegal, and Zambia and there are plans to expand the partnership to other countries in Africa and elsewhere.

• Controlling Tuberculosis in High HIV Prevalence Populations. Under the new WHO/ Joint U.N. Programme on HIV/AIDS strategic framework to decrease the burden of the intersecting epidemics of tuberculosis and HP//AIDS, the Uni?ed States and the government of Japan will work with partners to improve coordination on TB prevention and control (intensified case-finding and cure) and interventions against HIV (and therefore indirectly against tuberculosis).

• Universal Flour Fortification. This public-private partnership seeks to replicate a successful iodized salt fortification model and address selected major remaining micronutrient deficiencies through fortification of flour with iron, folic acid, and other appropriate micronutrients. The partnership involves the U.S. Departments of Health and Human Services and Agriculture; the Australian, Canadian and U.S. Wheat Boards; the North American Millers' Association; the North American Grain Exports Association; and others.

• Health Promotores. This partnership will share experiences and best models related to community health outreach and education using lay community members in underserved areas. The promotores concept derived from Mexico and Latin American countries and is currently being pursued in U.S.-Mexico border communities. Partners include the U.S. Department of Health and Human Services' Health Resources and Services Administration, Environmental Protection Agency, the government of Mexico, and the University of Arizona.

• Children's Environmental Health Indicators. This initiative proposes the creation of an international forum of governments, U.N. agencies, intergovernmental and nongovernmental organizations, the private sector, and communities to advance a global effort to create children's environmental health indicators. This may involve proposing modifications to the existing data collection surveys in the U.N. system to incorporate children's environmental health, which may include developing, testing, and promoting the use of indicators.

Education

• Africa Education Initiative. This Presidential initiative, which was announced in June 2002, will provide $200 million over the next 5 years to train more than 160,000 new teachers and provide in-service training for more than 260,000 existing teachers in Africa, partner with historically black colleges and universities in America to provide 4.5 million more textbooks and other learning tools for children in Africa, provide 250,000 scholarships for African girls, and increase the role of parents in their children's education by working to make school systems more transparent and open to reforms from parents.

• Global Food for Education. This multilateral school feeding pilot program may help as many as seven million school children, especially girls. The 2002 Farm Bill provides $100 million in fiscal year 2003 to continue the pilot program. The United States is reviewing the effectiveness and cost-effectiveness of the program in meeting its educational and food aid objectives.

Sustainable Tourism

• Vilanculos Coastal Wildlife Sanctuary. The Overseas Private Investment Corporation is helping to finance this $10 million coastal and wildlife eco-tourism project in Mozambique's Bazaruto Archipelago. Backed by the Global Environmental Facility, the International Finance Corporation, and the International Union for the Conservation of Nature and Natural Resources, the Sanctuary has followed world standards with regard to social and environmental issues. The project will provide

economic development from tourism and job creation, and community development, including a health clinic, school, and housing.

Transport

- Nacala Port and Railway Network. The Overseas Private Investment Corporation will provide financial assistance up to $35 million to a U.S. project sponsor to develop and rehabilitate the railway corridor through Malawi and Mozambique and to refurbish the exiting port at Nacala. This will provide a less expensive alternative to Durban, South Africa, for moving goods to and from landlocked countries and enhance agricultural productivity and exports by reducing transport costs.

STATEMENT OF JAMES L. CONNAUGHTON, CHAIRMAN, WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY

Mr. Chairmen, Senator Smith, Senator Lugar and Members of the Committee: I appreciate the opportunity to appear before the Committee today to discuss the Bush Administration's strategy to address the important, long-term, and highly complex challenge of global climate change. I am pleased to share this panel with my colleague Mr. Turner.

President Bush has committed the Nation to ambitious, focused and meaningful goals, programs and initiatives that provide a sensible and constructive path forward. The President's strategy is predicated on ensuring the strength and growth of the American economy, building on our nation's tremendous and demonstrated record of leadership in science and the promise of continued American technological innovation. As the President stated over a year ago: "We will act, learn, and act again, adjusting our approaches as science advances and technology evolves." He elaborated on this point this past February: "[G]lobal climate change presents a different set of challenges and requires a different strategy [from policies designed to reduce air pollution]. The science is more complex, the answers are less certain, and the technology is less developed. So we need a flexible approach that can adjust to new information and new technology." The flexible path toward long term progress that I will outline for you today sharply contrasts with the view of some that the only acceptable policy approach is near term, legislated restrictions that will needlessly hurt our economy and cost American jobs.

The President committed the Nation to an immediate goal of reducing America's greenhouse gas emissions relative to the size of our economy by 18 percent in the next 10 years. This will set America on a path to slow the growth of our greenhouse gas emissions and, if science justifies, to stop and then reverse the growth of emissions. I would emphasize that achieving this ambitious, yet realistic, national goal will require a sustained commitment and significant investment and effort from our nation's farmers, small businesses, workers, industries, and citizens that rivals the hard gains in efficiency and productivity we have earned over the last several decades.

To achieve this goal, the Administration is actively engaged and moving forward on many fronts, looking at every sector of our economy, with the recognition that meaningful progress depends on the development and deployment of new technology. With the continued support of Congress, we are advancing climate science, developing and promoting energy efficiency, conservation, and sequestration technologies and practices, pursuing near term greenhouse gas mitigation programs and expanding international cooperation.

The President has reaffirmed America's commitment to the goal of stabilizing atmospheric greenhouse gas concentrations at a level that will prevent dangerous interference with the climate. At the same time, the President noted that given current scientific uncertainties, no one knows what that level is. This underscores the importance of the President's focus on science and technology.

The President has called for nearly $700 million in additional funding for the Federal Government's commitment to climate change in Fiscal Year 1903—a 17 percent increase from last year—to support a $4.5 billion program of research on climate science and energy technology, mitigation incentives and programs, and international technology transfer and outreach. This commitment is unmatched in the world. The President's recent Report to Congress on Federal Climate Change Expenditures details the numerous programs that this funding will support. And there is a Cabinet-level effort to bring more effective, high level management and focus to this significant investment of public resources.

Importantly, the President's request includes $555 million in clean energy tax incentives, the first part of a $4.6 billion commitment over the next 5 years, reaching $7.1 billion over the next 10 years. These incentives will spur investments in and

purchases of renewable energy—including solar, wind, and biomass—as well as advanced hybrid and fuel cell vehicles, cogeneration, and landfill gas conversion. We also are promoting clean coal technology, as well as nuclear power—which produces no greenhouse gas emissions—and are working to safely improve fuel economy for our cars and trucks. And we are advancing the prospect of breakthrough technologies, such as the promise of zero-emission fuel cell vehicles through the Department of Energy's Freedom Car Initiative.

Under the recently enacted Farm bill and existing authorizations, we will invest up to $47 billion in the next decade for conservation on our farms and forest lands. Not only will this partnership with farmers and small land owners help protect the water and air, and secure and enhance habitat for wildlife, it will also provide opportunities to store significant quantities of carbon in trees and the soil, and promote other activities to mitigate greenhouse gas emissions.

We also are making substantial progress on the effort to create world-class standards for measuring and registering greenhouse gas emissions reductions, with organizations receiving transferable credits for the reductions in emissions they secure. At the same time, we are making progress on the President's challenge to businesses to further reduce their emissions. EPA's Climate Leaders Program is well underway. We look forward to seeing new commitments and even greater reductions.

These are simply a few significant examples of more than 60 Federal programs—some mandatory, some incentive-based, some voluntary—that will help to slow the growth in U.S. greenhouse gas emissions over the next decade and beyond.

The President's strategy has also created a new framework for expanding international cooperation. We are investing $25 million in climate observation systems in developing countries, increasing funding for tropical forest conservation to $50 million, and providing $178 million for the Global Environmental Facility next year, which includes a substantial $70 million payment for arrears incurred during the prior administration. The President's fiscal yea4r 2003 budget also requests $156 million in funding for USAID climate change programs. And in the past year alone, the Administration has entered into bilateral agreements with Japan, Australia, Canada, Italy, the European Union, CONCAUSA, China and India on climate change science, energy and sequestration technology, and policy approaches.

The President's climate change strategy is the product of an ongoing, combined working group of the National Security Council, the Domestic Policy Council and the National Economic Council. Our actions have been and will continue to be guided by the six principles that the President outlined last June:

1. Consistency with the long-term goal of stabilizing concentrations of greenhouse gases in the atmosphere at a level that will prevent dangerous interference with the climate system, recognizing that we currently do not know what that level is;
2. Measured actions, as we learn more from science and build on it;
3. Flexibility to adjust to new information and take advantage of new technology;
4. Ensuring continued economic growth and prosperity for the United States and the world;
5. Pursuing market-based incentives and spurring technological innovation; and
6. Global participation, including developing countries.

The Bush Administration's strategy for action and progress—a solid policy framework, a meaningful national emissions reduction goal, and a suite of policies to achieve that goal—is calibrated to the actual state of scientific knowledge and guards against costly and misdirected policy errors. Commentary that continues to equate action on climate change with acceptance of the Kyoto Protocol ignores the bipartisan record of opposition to its approach. The Kyoto Protocol would have cost our economy up to $400 billion and caused the loss of up to 4.9 million jobs, risking the welfare of the American people and American workers. And without the participation of the world's developing countries, many of which will experience rapid growth in coming decades, it represented an ineffective policy response to this global challenge.

President Bush's philosophy—which ties our benchmark for progress with economic growth—represents a careful balancing that promises significant emissions reductions over the course of the next decade, while preserving the strength of the American economy. Only sustained economic growth, both here and abroad, will allow for the significant new investments in energy and sequestration technologies that will be needed to address this long term challenge.

Again, thank you for inviting me today. I would be pleased to answer any questions that you may have and ask that the written material accompanying my testimony be entered into the record.

APPENDICES

1. STATEMENT OF PRESIDENT GEORGE BUSH (JUNE 11, 2001)

THE WHITE HOUSE
OFFICE OF THE PRESS SECRETARY
For Immediate Release June 11, 2001

PRESIDENT BUSH DISCUSSES GLOBAL CLIMATE CHANGE

The Rose Garden
11:10 A.M. EDT

President George W. Bush. Good morning. I've just met with senior members of my administration who are working to develop an effective and science-based approach to addressing the important issues of global climate change.

This is an issue that I know is very important to the nations of Europe, which I will be visiting for the first time as President. The earth's well-being is also an issue important to America. And it's an issue that should be important to every Nation in every part of our world.

The issue of climate change respects no border. Its effects cannot be reined in by an army nor advanced by any ideology. Climate change, with its potential to impact every corner of the world, is an issue that must be addressed by the world.

The Kyoto Protocol was fatally flawed in fundamental ways. But the process used to bring nations together to discuss our joint response to climate change is an important one. That is why I am today committing the United States of America to work within the United Nations framework and elsewhere to develop with our friends and allies and nations throughout the world an effective and science-based response to the issue of global warming.

My Cabinet-level working group has met regularly for the last 10 weeks to review the most recent, most accurate, and most comprehensive science. They have heard from scientists offering a wide spectrum of views. They have reviewed the facts, and they have listened to many theories and suppositions. The working group asked the highly respected National Academy of Sciences to provide us the most up-to-date information about what is known and about what is not known on the science of climate change.

First, we know the surface temperature of the earth is warming. It has risen by .6 degrees Celsius over the past 100 years. There was a warming trend from the 1890's to the 1940's. Cooling from the 1940's to the 1970's. And then sharply rising temperatures from the 1970's to today.

There is a natural greenhouse effect that contributes to warming. Greenhouse gases trap heat, and thus warm the earth because they prevent a significant proportion of infrared radiation from escaping into space. Concentration of greenhouse gases, especially CO_2, have increased substantially since the beginning of the industrial revolution. And the National Academy of Sciences indicate that the increase is due in large part to human activity.

Yet, the Academy's report tells us that we do not know how much effect natural fluctuations in climate may have had on warming. We do not know how much our climate could, or will change in the future. We do not know how fast change will occur, or even how some of our actions could impact it.

For example, our useful efforts to reduce sulfur emissions may have actually increased warming, because sulfate particles reflect sunlight, bouncing it back into space. And, finally, no one can say with any certainty what constitutes a dangerous level of warming, and therefore what level must be avoided.

The policy challenge is to act in a serious and sensible way, given the limits of our knowledge. While scientific uncertainties remain, we can begin now to address the factors that contribute to climate change.

There are only two ways to stabilize concentration of greenhouse gases. One is to avoid emitting them in the first place; the other is to try to capture them after they're created. And there are problems with both approaches. We're making great progress through technology, but have not yet developed cost-effective ways to capture carbon emissions at their source; although there is some promising work that is being done.

And a growing population requires more energy to heat and cool our homes, more gas to drive our cars. Even though we're making progress on conservation and energy efficiency and have significantly reduced the amount of carbon emissions per unit of GDP.

Our country, the United States is the world's largest emitter of manmade greenhouse gases. We account for almost 20 percent of the world's man-made greenhouse emissions. We also account for about one-quarter of the world's economic output. We

recognize the responsibility to reduce our emissions. We also recognize the other part of the story—that the rest of the world emits 80 percent of all greenhouse gases. And many of those emissions come from developing countries.

This is a challenge that requires a 100 percent effort; ours, and the rest of the world's. The world's second-largest emitter of greenhouse gases is China. Yet, China was entirely exempted from the requirements of the Kyoto Protocol.

India and Germany are among the top emitters. Yet, India was also exempt from Kyoto. These and other developing countries that are experiencing rapid growth face challenges in reducing their emissions without harming their economies. We want to work cooperatively with these countries in their efforts to reduce greenhouse emissions and maintain economic growth.

Kyoto also failed to address two major pollutants that have an impact on warming: black soot and tropospheric ozone. Both are proven health hazards. Reducing both would not only address climate change, but also dramatically improve people's health.

Kyoto is, in many ways, unrealistic. Many countries cannot meet their Kyoto targets. The targets themselves were arbitrary and not based upon science. For America, complying with those mandates would have a negative economic impact, with layoffs of workers and price increases for consumers. And when you evaluate all these flaws, most reasonable people will understand that it's not sound public policy.

That's why 95 members of the U.S. Senate expressed a reluctance to endorse such an approach. Yet, America's unwillingness to embrace a flawed treaty should not be read by our friends and allies as any abdication of responsibility. To the contrary, my administration is committed to a leadership role on the issue of climate change.

We recognize our responsibility and will meet it—at home, in our hemisphere, and in the world. My Cabinet-level working group on climate change is recommending a number of initial steps, and will continue to work on additional ideas. The working group proposes the United States help lead the way by advancing the science on climate change, advancing the technology to monitor and reduce greenhouse gases, and creating partnerships within our hemisphere and beyond to monitor and measure and mitigate emissions.

I also call on Congress to work with my administration to achieve the significant emission reductions made possible by implementing the clean energy technologies proposed in our energy plan. Our working group study has made it clear that we need to know a lot more.

The U.N. Framework Convention on Climate Change commences to stabilizing concentrations at a level that will prevent dangerous human interference with the climate; but no one knows what that level is. The United States has spent $18 billion on climate research since 1990—three times as much as any other country, and more than Japan and all 15 nations of the EU combined.

Today, I make our investment in science even greater. My administration will establish the U.S. Climate Change Research Initiative to study areas of uncertainty and identify priority areas where investments can make a difference.

I'm directing my Secretary of Commerce, working with other agencies, to set priorities for additional investments in climate change research, review such investments, and to improve coordination amongst Federal agencies. We will fully fund high-priority areas for climate change science over the next 5 years. We'll also provide resources to build climate observation systems in developing countries and encourage other developed nations to match our American commitment.

And we propose a joint venture with the EU, Japan and others to develop state-of-the-art climate modeling that will help us better understand the causes and impacts of climate change. America's the leader in technology and innovation. We all believe technology offers great promise to significantly reduce emissions—especially carbon capture, storage and sequestration technologies.

So we're creating the National Climate Change Technology Initiative to strengthen research at universities and national labs, to enhance partnerships in applied research, to develop improved technology for measuring and monitoring gross and net greenhouse gas emissions, and to fund demonstration projects for cutting-edge technologies, such as bioreactors and fuel cells.

Even with the best science, even with the best technology, we all know the United States cannot solve this global problem alone. We're building partnerships within the Western Hemisphere and with other like-minded countries. Last week, Secretary Powell signed a new CONCAUSA Declaration with the countries of Central America, calling for cooperative efforts on science research, monitoring and measuring of emissions, technology development, and investment in forest conservation.

We will work with the Inter-American Institute for Global Change Research and other institutions to better understand regional impacts of climate change. We will

establish a partnership to monitor and mitigate emissions. And at home, I call on Congress to work with my administration on the initiatives to enhance conservation and energy efficiency outlined in my energy plan, to implement the increased use of renewables, natural gas and hydropower that are outlined in the plan, and to increase the generation of safe and clean nuclear power.

By increasing conservation and energy efficiency and aggressively using these clean energy technologies, we can reduce our greenhouse gas emissions by significant amounts in the coming years. We can make great progress in reducing emissions, and we will. Yet, even that isn't enough.

I've asked my advisors to consider approaches to reduce greenhouse gas emissions, including those that tap the power of markets, help realize the promise of technology and ensure the widest-possible global participation. As we analyze the possibilities, we will be guided by several basic principles. Our approach must be consistent with the long-term goal of stabilizing greenhouse gas concentrations in the atmosphere. Our actions should be measured as we learn more from science and build on it.

Our approach must be flexible to adjust to new information and take advantage of new technology. We must always act to ensure continued economic growth and prosperity for our citizens and for citizens throughout the world. We should pursue market-based incentives and spur technological innovation.

And, finally, our approach must be based on global participation, including that of developing countries whose net greenhouse gas emissions now exceed those in the developed countries.

I've asked Secretary Powell and Administrator Whitman to ensure they actively work with friends and allies to explore common approaches to climate change consistent with these principles. Each step we take will increase our knowledge. We will act, learn, and act again, adjusting our approaches as science advances and technology evolves.

Our administration will be creative. We're committed to protecting our environment and improving our economy, to acting at home and working in concert with the world. This is an administration that will make commitments we can keep, and keep the commitments that we make.

I look forward to continued discussions with our friends and allies about this important issue.

Thank you for coming.

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Introduction

Three months ago, the President directed a Cabinet-level review of U.S. climate change policy. Members of the Cabinet, the Vice President, and senior White House staff have been meeting to examine the science, technologies, current U.S. efforts, and a wide range of innovative options for addressing concentrations of greenhouse gases in the atmosphere.

During that time, the Cabinet-level climate change working group has held regular and intensive sessions and has heard from many experts representing a wide range of views. To obtain the most recent information and a balanced view of what we know and do not know about the science of climate change, the working group requested a report from the National Academy of Sciences. The report outlines areas supported by the science and significant gaps in our knowledge of climate change.

The following material contains the initial findings of the working group: summaries of current U.S. actions, an analysis of the Kyoto Protocol, and proposals to advance the science, advance technologies, and create partnerships in the Western Hemisphere and throughout the world to address climate change.

The President has directed the Cabinet-level climate change working group to press forward and develop innovative approaches in accordance with several basic principles. These approaches should: (1) be consistent with the long-term goal of stabilizing greenhouse gas concentrations in the atmosphere; (2) be measured, as we learn more from science and build on it; (3) be flexible to adjust to new information and take advantage of new technology; (4) ensure continued economic growth and prosperity; (5) pursue market-based incentives and spur technological innovation; and (6) be based on global participation, including developing countries.

The Cabinet-level climate change working group will continue its review consistent with these principles.

CURRENT U.S. ACTIONS TO ADDRESS CLIMATE CHANGE

"The earth's well-being is also an issue important to America – and it's an issue that should be important to every nation and in every part of the world. My Administration is committed to a leadership role on the issue of climate change. We recognize our responsibility and we will meet it, at home, in our hemisphere, and in the world."

--President George W. Bush

Executive Summary

The United States government is currently pursuing a broad range of strategies to reduce emissions of greenhouse gases in the major greenhouse gas emitting sectors of our economy:

- **Electricity** -- Federal programs promote greenhouse gas reductions through the development of cleaner, more efficient technologies for electricity generation and transmission. The government is also supporting the development of renewable resources, such as solar energy, wind power, geothermal energy, hydropower, bio-energy, and hydrogen.
- **Transportation** -- The United States is currently promoting the development of fuel-efficient motor vehicles and trucks, researching options for producing cleaner fuels, and implementing programs to reduce the number of vehicle miles traveled.
- **Industry** -- The United States is implementing many partnership programs with industry to reduce emissions of carbon dioxide (CO_2) and other greenhouse gases, to promote source reduction and recycling, and to increase the use of combined heat and power.
- **Buildings** -- Federal voluntary partnership programs promote energy efficiency in the nation's commercial, residential, and government buildings (including schools) by offering technical assistance as well as the labeling of efficient products, efficient new homes, and efficient office buildings.
- **Agriculture and Forestry** -- The Federal government is implementing conservation programs that have the benefit of sequestering carbon in soils and off-setting agricultural emissions of greenhouse gases.
- **The Federal Government** – The Federal Government has taken steps to reduce greenhouse gas emissions from energy use in Federal buildings and in the Federal transportation fleet.
- **The National Energy Policy** – The National Energy Policy includes new recommendations to promote energy efficiency, conservation, increased use of natural gas and renewable energy, and the new construction of nuclear capacity.

United States government climate change programs are achieving real results, helping to reduce greenhouse gas emissions by 66 million metric tons of carbon equivalent in 2000. United States carbon intensity – the amount of CO2 emitted per unit of GDP – declined 15% from 1990 to 1999.

In addition, **businesses, state and local governments, and non-governmental organizations are addressing global climate change** – by improving the measurement and reporting of greenhouse gas emission reductions; through voluntary reductions, including emissions trading; and actions to sequester carbon through tree planting and forest preservation, restoration and management.

The Federal Government

The U.S. government is currently pursuing a broad range of strategies to reduce emissions of greenhouse gases, including:

- Voluntary public-private partnership programs that promote energy efficiency and the broader use of renewable energy;
- Research and development (R&D) investments and tax incentives to increase energy efficiency and the broader use of renewable energy;
- Appliance standards that increase the minimum level of efficiency of products on the market;
- Financial incentives such as grants to states and localities; and
- Programs to reduce greenhouse gas emissions from Federal buildings and transportation fleets.

These programs are achieving real reductions in greenhouse gas emissions – the U.S. government estimates that its existing climate change programs reduced emissions by 66 million metric tons of carbon equivalent (MMTCE) in 2000[1], approximately 2.7% of total emissions. The amount of CO2 emitted per unit of GDP declined 15% from 1990 to 1999.[2]

The following sections highlight **illustrative** programs in the major greenhouse gas emitting sectors of the economy: the electric power industry (32% of total U.S. greenhouse gas emissions); transportation (27%); other industry (21%); residential and commercial buildings (13%); and agriculture and forestry (net 7%) (unlike other sectors of the economy, agricultural and forestry activities can actively remove carbon dioxide from the atmosphere).[3]

Electricity

Federal programs promote greenhouse gas reductions through the development of cleaner, more efficient technologies for electricity generation and transmission. For example, the Environmental Protection Agency/Department of Energy *Combined Heat and Power Challenge*

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[1] Office of Management and Budget, based on estimates from Federal agencies including the Environmental Protection Agency and Department of Energy.
[2] Energy Information Agency, *Emissions of Greenhouse Gases in the U.S. 1999* (October 31, 2000) Report SAI/DOE-0573 (99).
[3] USEPA #236-R-01-001, *Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1999* (January 2001).

program has the goal of doubling U.S. combined heat and power capacity by 2010 by providing technical assistance and addressing regulatory issues where possible.

The Federal government is also supporting renewable resources such as solar energy, wind power, geothermal energy, hydropower, bio-energy, and hydrogen. For example, the Department of Energy supports the development of a wide range of solar and renewable energy technology, seeking to improve their reliability, expand their applicability, and reduce their costs. These activities have been very successful in bringing down technology costs. The cost of producing photo-voltaic modules has decreased 50 percent since 1991, and the cost of wind power has decreased 85 percent since 1980. Commercial success has been achieved for both of these areas in certain applications.

Transportation

The U.S. is currently promoting the development of fuel-efficient motor vehicles and trucks, researching options for producing cleaner fuels, and implementing programs to reduce the number of vehicle miles traveled. For example, through the *Partnership for a New Generation of Vehicles (PNGV)* program, the research has directly led to the commercial introduction of new hybrid vehicles and soon hydrogen as well. Commercialization of such vehicles could cut fuel use and carbon emissions for individual vehicles significantly and could lay the foundation for large, long-term fuel and carbon benefits. If 10% of the on-road vehicle fleet utilized PNGV technologies, the aggregate emission reductions could be approximately 20 million metric tons of carbon equivalent per year. The program is being extended to sport utility vehicles and other light trucks which, because of their lower baseline fuel economies, have the potential for even greater overall fuel and carbon savings per vehicle.

Industry

The U.S. government is implementing many partnership programs with industry to reduce emissions of carbon dioxide (CO_2) and other greenhouse gases, to promote source reduction and recycling, and to increase the use of combined heat and power. For example, current voluntary partnerships directed toward eliminating market barriers to the profitable collection and use of methane that otherwise would be released to the atmosphere are expected to hold methane emissions at or below 1990 levels through 2010. Since the launch of EPA's *Voluntary Aluminum Industrial Partnership* in 1995, the program's membership has grown to include 22 of the nation's 23 aluminum smelters, representing 94% of U.S. production capacity. As of 2000, program partners cumulatively achieved a 45% reduction in perfluorocarbon (a high global warming potential gas) emissions from 1990 levels.[4]

Commercial and Residential Buildings

Partnership programs promote energy efficiency in the nation's commercial, residential, and government buildings (including schools) by offering technical assistance as well as the labeling of efficient products, efficient new homes, and efficient office buildings. As one example, the

[4] *The Power of Partnerships: Energy Star and Other Voluntary Programs*, 2000 Annual Report of the Climate Protection Partnerships Division, U.S. EPA, Summer 2001.

EPA/DOE *Energy Star* program collaborates with a wide range of building owners and users -- retailers, real estate investors, small businesses, governments and schools. Each partner commits to improve the energy performance of its facilities and the most efficient buildings are awarded the *Energy Star* label. More than 16% of the U.S. commercial, public, and industrial building market is enrolled in *Energy Star*. Nationwide, *Energy Star* has eliminated the need for over 10,000 megawatts of peak generating capacity – equivalent to 20 large (50 MW) power plants.[5]

Agriculture and Forestry

The Federal government is conducting research into methods to reduce emissions of methane and nitrous oxide from agriculture, and is implementing conservation programs that have the benefit of sequestering carbon in soils and forests. For example, USDA's *Conservation Reserve Program* (CRP) has taken over 36 million acres of environmentally sensitive crop land out of production. CRP provides long-term environmental benefits, including the offset of up to 12 MMTCE each year.[6]

The Federal Government

The Federal Government has taken steps to reduce greenhouse gas emissions from energy use in Federal buildings and in the Federal transportation fleet by:

- Requiring all Federal agencies to take steps to cut greenhouse gas emissions from energy use in buildings by 30% below 1990 levels by 2010.
- Directing Federal agencies in Washington, D.C. to offer to their employees up to $65 per month in transit and van pool benefits.
- Requiring Federal agencies to implement strategies to reduce their fleet's annual petroleum consumption by 20% relative to 1999 consumption levels and to use alternative fuels a majority of the time.

Businesses, States and Communities, and Non-Governmental Organizations

Businesses, states and local governments, and non-governmental organizations are also moving forward to address global climate change -- through programs to improve the measurement and reporting of emission reductions; through voluntary programs, including emissions trading programs; and through sequestration programs. For example:

- Under the *Voluntary Reporting of Greenhouse Gases* program, provided by Section 1605(b) of the Energy Policy Act of 1992, more than 200 companies voluntarily reported to the Department of Energy their voluntary measures to reduce, avoid or sequester greenhouse gas emissions, principally carbon dioxide.[7] These companies undertook 1,715 projects and

[5] *The Power of Partnerships: Energy Star and Other Voluntary Programs*, 2000 Annual Report of the Climate Protection Partnerships Division, U.S. EPA, Summer 2001.
[6] Marlen Eve, Ron Follett, and Kieth Paustian. "Carbon Storage in Agricultural Soils of the United States: Estimating Emissions and Sequestration." U.S. Government Presentation at UNFCCC SBSTA13. Lyon, France. 2000.
[7] 1999 report, issued January 19, 2001

achieved greenhouse gas emission reductions and carbon sequestration equivalent to 61.5 MMTCE, or about 3.4 percent of 1999 total U.S. greenhouse gas emissions.[8]

- Electric Utilities: Several companies have committed to reducing greenhouse gas emissions. Measures include:

  - ✓ Improved generation efficiency (seasonal use of natural gas, hydroelectric turbine replacements, expanded capacity, shortened outage schedules at nuclear plants);
  - ✓ Improved pipeline, transmission and distribution equipment efficiencies (including reducing leaks);
  - ✓ Increased use of renewables (wind, biomass and solar);
  - ✓ Improved home and office energy efficiencies (low-income weatherization, home energy audits, inefficient refrigerator and freezer removal and recycling, installation of advanced energy management systems, planting trees, and retrofitting energy efficient lighting in company buildings); and
  - ✓ Investments in more efficient technologies (programs to install geothermal heat pumps, commercialize emerging energy efficient and renewable energy technologies, accelerate introduction of electric vehicles into the marketplace, and enhance carbon sequestration).

- Oil and Gas: Some oil and gas companies have added greenhouse gas reductions to their list of corporate priorities. One company intends to reduce its greenhouse gases by 10% by 2002 (over 1990 levels), and another company is seeking to reduce by 10% by 2010. To do this, the company is adopting an internal system of company-wide emissions trading to meet its goal in the most cost-effective way possible. Significant gains can be made from such measures as reducing flaring and leaking.

- Auto Manufacturers: Auto manufacturers have announced production plans for hybrid gas and electric vehicles in 2003 or 2004 and have pledged to increase their sport utility vehicles' fuel economy by 25% by 2005.

- Chemicals: A chemicals trade association supports voluntary programs and its members' actions to improve energy efficiency and reduce greenhouse gases. For example, one company says it will reduce its greenhouse gas emissions by 65% (by 2010, over 1990 levels). It already has cut its global emissions by 45% by making major process-change investments (reducing nitrous oxides), by holding energy consumption flat even with tremendous production growth (with powerhouse and process efficiencies), and increased use of renewable energy. Another company is working to reduce energy use by 20% per unit of production by 2005.

- Non-Governmental Organizations. Several non-governmental organizations and coalitions have initiated partnership programs with large global corporations to reduce emissions of greenhouse gases, and promote the use of energy conservation, renewable energy sources, and efficient technologies. Non-governmental organizations also are working with companies to support forestry projects that sequester carbon through tree planting and forest preservation, restoration and management.

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[8] DOE/EIA-0608 (1999), *Annual Report of the Voluntary Reporting of Greenhouse Gases*, February 12, 2001.

- States. More than 25 states have initiated state-based action plans to reduce greenhouse gas emissions. Some states are using market-based mechanisms to achieve reductions. For example, the State of New Jersey has established a 3.5% statewide reduction goal and is developing voluntary agreements with various businesses.

The National Energy Policy

The National Energy Policy includes numerous recommendations to promote energy efficiency and conservation and to reduce emissions of greenhouse gases through the use of alternative, renewable, and cleaner forms of energy.[9] These recommendations include:

Efficiency and Conservation Measures

- **Tax incentives and other initiatives to promote the use of combined heat and power.**

  The NEPD Group recommended that the President direct the Secretary of the Treasury to work with Congress to encourage increased energy efficiency through combined heat and power (CHP) projects by shortening the depreciation life for CHP projects or providing an investment tax credit.

  The NEPD Group also recommended that the President direct the Administrator of the Environmental Protection Agency (EPA) to work with local and state governments to promote the use of well-designed CHP and other clean power generation at brownfields sites, consistent with the local communities' interests. EPA will also work to clarify liability issues if they are raised at a particular site.

  The NEPD Group recommended that the President direct the EPA Administrator to promote CHP through flexibility in environmental permitting.

- **Reviewing and providing recommendations on establishing CAFE standards as well as other market-based approaches to increase the national average fuel economy of new motor vehicles.**

  The NEPD Group recommended that the President direct the Secretary of Transportation to:

  - ✓ Review and provide recommendations on establishing Corporate Average Fuel Economy (CAFE) standards with due consideration of the National Academy of Sciences study to be released in July 2001. Responsibly crafted CAFE standards should increase efficiency without negatively impacting the U.S. automotive industry. The determination of future fuel economy standards must therefore be addressed analytically and based on sound science.

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[9] *National Energy Policy: Report of the National Energy Policy Development Group*, May 2001.

- ✓ Consider passenger safety, economic concerns, and disparate impact on the U.S. versus foreign fleets of automobiles.
- ✓ Look at other market-based approaches to increasing the national average fuel economy of new motor vehicles.

➢ **Directing all agencies to use technological advances to better protect our environment.**

The Administration remains committed to investing in Intelligent Transportation Systems (ITS) and encourages the private sector to invest in ITS applications. This Department of Transportation (DOT) program funds the development of improved transportation infrastructure that will reduce congestion, such as traveler information/navigation systems, freeway management, and electronic toll collection. ITS applications reduce fuel associated with travel.

The Administration remains committed to the DOT's fuel-cell-powered transit bus program, authored by the Transportation Equity Act for the 21st Century (TEA-21). This program demonstrates the viability of fuel-cell power plants for transit bus applications.

The Administration remains committed to the Clean Buses program. TEA-21 establishes a new clean fuel formula grant program, which provides an opportunity to accelerate the introduction of advanced bus propulsion technologies into the mainstream of the nation's transit fleet.

➢ **Promoting energy efficiency, including expanding the *Energy Star* program.**

The NEPD Group recommended that the President direct the Secretary of Energy to conduct a review of current funding and historic performance of energy efficiency research and development programs in light of the recommendations of this report. In addition, the NEPD Group recommended that the President direct the Office of Science and Technology Policy and the President's Council of Advisors on Science and Technology to review and make recommendations on using the nation's energy resources more efficiently.

The NEPD Group recommended that the President direct the Secretary of Energy to promote greater energy efficiency:

- ✓ Expand the *Energy Star* program beyond office buildings to include schools, retail buildings, health care facilities, and homes.
- ✓ Extend the *Energy Star* labeling program to additional products, appliances, and services.
- ✓ Strengthen Department of Energy public education programs relating to energy efficiency.

The NEPD Group recommended that the President direct the EPA Administrator to develop and implement a strategy to increase public awareness of the sizable savings that energy efficiency offers to homeowners across the country.

The NEPD Group recommended that the President direct the Secretary of Energy to establish a national priority for improving energy efficiency. The priority would be to improve the

energy intensity of the U.S. economy as measured by the amount of energy required for each dollar of economic productivity. This increased efficiency should be pursued through the combined efforts of industry, consumers, and federal, state, and local governments.

- **Conserving energy at federal facilities.**

  The NEPD Group recommended that the President direct heads of executive departments and agencies to take appropriate actions to conserve energy use at their facilities to the maximum extent consistent with the effective discharge of public responsibilities.

- **Improving and expanding appliance standards.**

  The NEPD Group recommended that the President direct the Secretary of Energy to improve the energy efficiency of appliances:

  - ✓ Support the appliance standards program for covered products, setting higher standards where technologically feasible and economically justified.
  - ✓ Expand the scope of the appliance standards program, setting standards for additional appliances where technologically feasible and economically justified.

- **Promoting congestion mitigation technologies.**

  The NEPD Group recommended that the President direct the Secretary of Transportation to review and promote congestion mitigation technologies and strategies and work with Congress on legislation to implement these strategies.

- **Reducing demand for transportation fuels by establishing a ground freight management program.**

  The NEPD Group recommended that the President direct the EPA and DOT to develop ways to reduce demand for petroleum transportation fuels. These agencies will work with the trucking industry to establish a program to reduce emissions and fuel consumption from long-haul trucks at truck stops by implementing alternatives to idling, such as electrification and auxiliary power units at truck stops along interstate highways. EPA and DOT will develop partnership agreements with trucking fleets, truck stops, and manufacturers of idle-reducing technologies *(e.g.*, portable auxiliary packs, electrification) to install and use low-emission-idling technologies.

Alternative, Renewable, and Clean Forms of Energy

- **Increasing America's use of renewable and alternative energy**

  The NEPD Group recommended that the President direct the Secretaries of the Interior and Energy to re-evaluate access limitations to federal lands in order to increase renewable energy production, such as biomass, wind, geothermal, and solar.

The NEPD Group supported the increase of $39.2 million in the FY 2002 budget amendment for the Department of Energy's Energy Supply account that would provide increased support for research and development of renewable energy resources.

The NEPD Group recommended that the President direct the Secretary of Energy to **conduct a review of current funding and historic performance of renewable energy and alternative energy research and development programs.** Based on this review, the Secretary of Energy is then directed to propose appropriate funding of those research and development programs that are performance-based and are modeled as public-private partnerships.

The NEPD Group recommended that the President direct the Secretary of the Treasury to work with Congress to **develop legislation to provide for a temporary income tax credit available for the purchase of new hybrid or fuel-cell vehicles** between 2002 and 2007.

The NEPD Group recommended that the President direct the Secretary of the Treasury to work with Congress on legislation **to expand the section 29 tax credit to make it available for new landfill methane projects.** The credit could be tiered, depending on whether a landfill is already required by federal law to collect and flare its methane emissions due to local air pollution concerns.

The NEPD Group recommended that the President direct the Secretary of the Interior to determine ways to **reduce the delays in geothermal lease processing** as part of the permitting review process.

The NEPD Group recommended that the President direct the Secretary of the Treasury to work with Congress on legislation to **extend and expand tax credits for electricity produced using wind and biomass.** The President's budget request extends the present 1.7 cents per kilowatt hour tax credit for electricity produced from wind and biomass; expands eligible biomass sources to include forest-related sources, agricultural sources, and certain urban sources; and allows a credit for electricity produced from biomass co-fired with coal.

The NEPD Group recommended that the President direct the Secretary of the Treasury to work with Congress on legislation **to provide a new 15 percent tax credit for residential solar energy property**, up to a maximum credit of $2,000.

The NEPD Group recommended that the President direct the Secretary of the Treasury to work with Congress to **continue the ethanol excise tax exemption**.

The NEPD Group recommended that the President direct the Secretary of Energy to develop next-generation technology—including hydrogen and fusion:

- ✓ Develop an education campaign that communicates the benefits of alternative forms of energy, including hydrogen and fusion.

- ✓ Focus research and development efforts on integrating current programs regarding hydrogen, fuel cells, and distributed energy.
- ✓ Support legislation reauthorizing the Hydrogen Energy Act.

- **Promoting new construction of nuclear capacity that could significantly reduce future greenhouse gas emissions.**

The NEPD Group recommended that the President support the expansion of nuclear energy in the United States as a major component of our national energy policy. Following are specific components of the recommendation:

- ✓ Encourage the Nuclear Regulatory Commission (NRC) to ensure that safety and environmental protection are high priorities as they prepare to evaluate and expedite applications for licensing new advanced-technology nuclear reactors.
- ✓ Encourage the NRC to facilitate efforts by utilities to expand nuclear energy generation in the United States by uprating existing nuclear plants safely.
- ✓ Encourage the NRC to relicense existing nuclear plants that meet or exceed safety standards.
- ✓ Direct the Secretary of Energy and the Administrator of the Environmental Protection Agency to assess the potential of nuclear energy to improve air quality.
- ✓ Increase resources as necessary for nuclear safety enforcement in light of the potential increase in generation.
- ✓ Use the best science to provide a deep geologic repository for nuclear waste.
- ✓ Support legislation clarifying that qualified funds set aside by plant owners for eventual decommissioning will not be taxed as part of the transaction.
- ✓ Support legislation to extend the Price–Anderson Act.

- **Market-based three pollutant strategy**

The NEPD Group recommended that the President direct the EPA Administrator to work with Congress to propose legislation that would establish a flexible, market-based program to significantly reduce and cap emissions of sulfur dioxide, nitrogen oxides, and mercury from electric power generators. Such a program (with appropriate measures to address local concerns) would provide significant public health benefits, including ancillary carbon benefits, even as we increase electricity supplies.

- ✓ Establish mandatory reduction targets for emissions of three main pollutants: sulfur dioxide, nitrogen oxides, and mercury.
- ✓ Phase in reductions over a reasonable period of time, similar to the successful acid rain reduction program established by the 1990 amendments to the Clean Air Act.
- ✓ Provide regulatory certainty to allow utilities to make modifications to their plants without fear of new litigation.

- ✓ Provide market-based incentives, such as emissions trading credits to help achieve the required reductions.

- **Increasing research in clean coal technologies.**

  The NEPD recommended that the President direct the Department of Energy to continue to develop advanced clean coal technology:

  - ✓ Investing $2 billion over 10 years to fund research in clean coal technologies.
  - ✓ Supporting a permanent extension of the existing research and development tax credit.
  - ✓ Directing federal agencies to explore regulatory approaches that will encourage advancements in environmental technology.

An Analysis of the Kyoto Protocol

"The Kyoto Protocol was fatally flawed in fundamental ways. But the process used to bring nations together to discuss our joint response to climate change is an important one."

– President George W. Bush

The Kyoto Protocol is fundamentally flawed The Kyoto Protocol fails to establish a long-term goal based on science, poses serious and unnecessary risks to the U.S. and world economies, and is ineffective in addressing climate change because it excludes major parts of the world.

The Kyoto Protocol is ineffective in addressing climate change because it excludes developing countries. The Kyoto Protocol's emission reduction requirements apply only to industrialized countries. Developing countries can continue business as usual under the Kyoto Protocol, despite their rapidly growing emissions:

- Current data indicate that developing countries' net emissions (including emissions and uptake from land use activities) have already exceeded those of the developed world.[10]

- Moreover, annual developing country emissions of CO_2 will double between 1990 and 2010 – an increase that represents over twice as many tons as all of the reductions the United States would be required to take under the Kyoto Protocol.[11]

The Kyoto Protocol's targets are not based on science. Its targets and timetables were arrived at arbitrarily as a result of political negotiations, and are not related to any specific scientific information or long-term objective.

The Kyoto Protocol targets are precipitous. Under the Kyoto Protocol, the emission reduction target for the United States is 7% from 1990 levels for each year from 2008-2012. However, the figure of 7% is misleading, because it does not take into account growth in emissions between 1990 and 2012. The actual reduction from the U.S. current emissions trajectory for this period is over 30%.[12] In other words, meeting its target would require the United States to reduce its output of greenhouse emissions by one third in less than seven years. This would require U.S. firms to retire large amounts of capital stock prematurely, imposing substantial and unnecessary costs on the U.S. economy. The Kyoto Protocol also does not allow countries to count legitimate mitigation activities. In fact, it restricts the use of carbon sequestration as a means of achieving its objectives. Moreover, it does not address substances that impact climate change, such as black carbon and tropospheric ozone, reductions of which would also have significant health benefits.

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[10] IPCC Special Report on Emission Scenarios, International Energy Agency data (www.iea.org) and Land-use data from Oak Ridge Laboratory Carbon Dioxide Information Analysis Center (cdiac.esd.ornl.gov).
[11] International Energy Outlook 2001, Energy Information Administration (www.eia.doe.gov/oiaf/ieo)
[12] United States submission to the UNFCCC, 2001

The Kyoto Protocol risks significantly harming the U.S. and global economies. The Kyoto Protocol would require the United States to meet its target no matter what the cost, which could be substantial:

- Most models suggest a reduction in U.S. GDP of 1% to 2% by 2010 as a result of Kyoto without emissions trading.[13] A 2% reduction is comparable to the impact of the oil shock of the 1970s.

- A U.S. Department of Energy model suggests a reduction of as much as 4%[14] in GDP under a scenario in which the United States does not establish implementing regulations before 2005 and does not engage in emissions trading. Under such a scenario, the U.S. economy could be transformed from one of strong growth to recession, with potentially significant repercussions for the global economy.

Other major industrial countries also have very stringent targets. The difficulties many countries will have in meeting their targets raises serious questions about the viability of the Kyoto Protocol framework.

The Kyoto Protocol would leave the United States dangerously dependent on other countries to meet its emission targets. Under the Kyoto Protocol's emissions trading system, countries are allowed to buy and sell part of their emissions allowances. Most economic models indicate that achieving reductions through emissions trading with other countries may cost about half of what it would cost to achieve the same reductions domestically under the Kyoto Protocol.[15] Many analysts have pointed to trading as the only way that the United States could meet its Kyoto target. Yet few countries will have many excess tons to sell other than Russia and several other Eastern European countries that negotiated targets well above their expected emissions during the period 2008-2012. There is no guarantee that these allowances would be available:

- In order to sell allowances, countries must meet measuring and monitoring requirements. Some countries with excess emissions are far from meeting these requirements now, and it is likely that the United States and other countries would not know until at least 2007 whether they could meet their requirements. This creates enormous uncertainty about the cost of meeting the Kyoto Protocol until well after the United States has assumed its obligations.

- Even if these countries met their requirements and were allowed to sell their emission allowances, U.S. purchases of allowances would amount to many billions of dollars of financial transfers annually – without achieving any meaningful greenhouse gas emission reductions or climate benefit.

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[13] Energy Modeling Forum results reported in IPCC Working Group III Third Assessment Report, Ch. 18, p. 70 (Final Government Distribution version)

[14] Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity, US Energy Information Administration, 2000

[15] Energy Modeling Forum results reported in IPCC Working Group III Third Assessment Report, Ch. 18, p. 70 (Final Government Distribution version)

Advancing Technology to Address Climate Change

"America is a leader in technology and innovation. We all believe technology offers great promise to significantly reduce emissions. So we are creating the 'National Climate Change Technology Initiative.' "
– President George W. Bush

Executive Summary

New technologies hold the promise of increasing our supply of energy more efficiently and more cleanly. Technology has also played and will continue to play an important role in reducing greenhouse gas emissions and controlling costs. Because greenhouse gas emissions come from many sectors of the economy, a wide variety of technologies will be needed. A portfolio of technologies to address climate change could include energy efficient technologies; lower carbon-emitting technologies; carbon capture, storage and sequestration technologies; and new technological discoveries yet to be made.

To advance the technology across each of these areas, President Bush will create the **National Climate Change Technology Initiative**. The President is charging the Secretaries of Commerce and Energy, working with other agencies, to:

- **Evaluate the current state of U.S. climate change technology research and development** and make recommendations for improvements.
- **Provide guidance on strengthening basic research** at universities and national laboratories, including the development of the advanced mitigation technologies that offer the greatest promise for low-cost reductions of greenhouse gas emissions.
- **Develop opportunities to enhance private-public partnerships** in applied research and development to expedite innovative and cost-effective approaches to reduce greenhouse gas emissions.
- **Make recommendations for funding demonstration projects** for cutting-edge technologies.
- **Develop improved technologies for measuring and monitoring** gross and net greenhouse gas emissions.

The National Climate Change Technology Initiative also will enhance coordination across federal agencies, and among the federal government, universities, and the private sector.

The Importance of Technology to Mitigate Climate Change

Technology will continue to play an important role in reducing greenhouse gas emissions and controlling costs. The long-term objective of the 1992 Framework Convention on Climate Change – to stabilize greenhouse gas concentrations in the atmosphere – can be addressed in two ways. First, by reducing emissions of greenhouse gases. Because greenhouse gases are emitted so broadly across society, no single technology appears to be sufficient to stabilize the increasing atmospheric greenhouse gas concentrations. Rather, **a portfolio of technologies aimed at improving energy efficiency, and increasing the use of low carbon fuels will help to reduce greenhouse gas emissions and ultimately to stabilize concentrations.**

Second, greenhouse gas concentrations can be addressed by means of capturing and sequestering gases, either at the source or after they have been released into the atmosphere. Limited carbon capture is occurring today, using currently available technologies. **Continued research and development is needed to explore advanced chemical and biological mechanisms to remove carbon dioxide from the atmosphere**.

General Investment Criteria

The Presidents of the National Academy of Sciences, National Academy of Engineering, and the Institute of Medicine have provided some general principles for government investment in technology. In "Preparing for the 21st Century: Science and Technology Policy in a New Era" (October 23, 1997), the Presidents of the Academies offered criteria for such investment, including:

- Direct government investments in science and technology should be focused on long-range, broadly useful research in basic technology and science, both of which produce benefits far in excess of what private sector entities can capture for themselves.

- The federal government should cooperate with the private sector so that the United States maintains a position of leadership in those technologies that promise to have a major and continuing impact on broad areas of industrial and economic performance.

- But the government need not invest in fields in which the private sector already has programs of development in place. Private firms have the primary responsibility for product development, but federal and state governments play an important role in enhancing the civilian technology base and its adoption through their economic, regulatory, and trade policies, their support for research and development, and their own procurement of technology.

- Maintaining U.S. leadership in science and technology despite budget constraints will require discipline in the allocation of resources for federal investments. Within the general constraints determined by national priorities, the selection of individual projects must reflect the highest standards of the scientific and technical community.

Assessing the Current State of U.S. Climate Change Technology Research

The U.S. government has funded research to develop several technologies that mitigate climate change. In general, these technologies are aimed at: increasing energy efficiency to reduce the amount of energy consumed for goods produced in the economy; creating opportunities to switch to fuels and products that emit relatively lower amounts of greenhouse gases; enhancing carbon removal and storage in terrestrial, ocean, and geological sinks; and exploring innovative concepts along unconventional paths to discover new ways to reduce greenhouse gas emissions, such as advanced biotechnology concepts.

In order to advance climate change technology research, President Bush will:

- **Charge the Secretary of Commerce, the Administrator of the Environmental Protection Agency, and the Secretary of Energy to evaluate the current state of U.S. climate change technology research and development** and make recommendations for improvements.

Strengthening Basic Climate Change Technology Research

The development of certain climate change mitigation technologies may be impractical for the private sector. Such technologies have some unique characteristics, including instances where the:

- Benefits are too widely spread for any one company to recover its investment at a profit;
- Cost or risk is too great for any individual company to bear alone; or
- Potential benefits are too far in the future to pass the threshold of private investment criteria.

Yet these advanced concepts may have the greatest potential to reduce greenhouse gas emissions at very low cost. For example, **technological advances in areas such as biotechnology offer the potential for dramatic innovations in many areas**. An important technology is the development of bioreactors that can harness the potential of microbial communities, such as photosynthetic bacteria, to produce clean fuels such as hydrogen. These bioreactors can exploit our increasing understanding of the biochemical pathways of microbial communities. While these biotechnologies are currently producing higher value products, like pharmaceuticals, significant new scientific research will be required for the direct production of fuels.

Similarly, **scientists have begun work on promising new technologies for the cost-effective capture and sequestration of carbon in terrestrial and marine ecosystems**. These opportunities may provide other environmental benefits as well, such as improved soil quality, better retention of moisture and nutrients, and reduced soil erosion. Researchers at the Department of Energy, for example, are studying "mineral carbonization," a technique for turning gaseous CO_2 into an environmentally-benign mineral that could be used to refill mine pits in land reclamation efforts.

Research and development efforts to date show promise for several options. However, many options are still emerging concepts both in the United States and internationally. Estimates of their potential for mitigating climate change are large, but highly uncertain. Markets for these or other technologies will be developed if buyers have some assurance about the quantity and quality of the product they are purchasing. In addition, there are many scientific and technological challenges regarding costs, environmental impacts, and public acceptability that must be resolved before these climate mitigation technologies can reach their potential. How and how much to invest in these areas are questions that must be answered to ensure that we as a society can harness our technological resources and capabilities and find the most cost-effective and environmentally sound solutions to the risks posed by increasing atmospheric concentrations of greenhouse gases.

Therefore, President Bush has directed that the National Climate Change Technology Initiative will:

- **Provide guidance on strengthening basic research** at universities and national laboratories, including the development of the advanced mitigation technologies that offer the greatest promise for low-cost reductions of greenhouse gas emissions.

Enhancing Private-Public Partnerships

It is important to effectively use the technologies that are and will soon become available. For example, technologies designed to increase energy efficiency, such as industrial applications of combined heat and power (CHP), enable both the local generation of electricity and the efficient use of the byproduct heat. When the quantities of the heat and power produced are well matched to the requirements of an industrial plant or facility, total efficiency of the fuel utilization can reach 90 percent, avoiding significant emissions of CO_2.

Similarly, the United States can achieve significant reductions of energy consumption and the related emissions of greenhouse gases through building systems with integrated electronic sensors, "smart" windows, and computers to monitor, maintain, and manage building operations. Also, one of the most challenging and important elements of a comprehensive strategy to address long-term greenhouse gas emission reductions is to improve the efficiency of our transportation fleet. The development of higher efficiency, hybrid passenger vehicles is an important first step.

In addition to energy efficiency, there are opportunities to increase the use of fuels that emit fewer greenhouse gases. For example, increased use of biomass residues and development of herbaceous crops, like native American prairie switchgrass, can mitigate greenhouse gases from coal-fired power plants and reduce air toxic emissions. Similarly, biomass can be converted into simple chemicals and plastic substitutes from which a new chemical industry can be formed.

Currently, the Federal government has established partners in the private sector to advance these technologies. It is critical to enhance this role and ensure that partnerships with industry are directed toward the most mutually beneficial outcomes.

Therefore, President Bush has directed that the National Climate Change Technology Initiative will:

- **Develop opportunities to enhance private-public partnerships** in applied research and development to expedite innovative and cost-effective approaches to reduce greenhouse gas emissions.

Promoting Cutting Edge Technology

Cutting-edge technologies hold the promise of helping to reduce emissions of greenhouse gases. For instance, geothermal power plants have a proven record of performance for producing reliable base-load power with minimal environmental effects. However, substantial known resources have not been tapped. Advanced technology is being developed to make more geothermal resources economical over a larger portion of the country. In response to the electricity shortages in the West, a demonstration of the economic and environmental benefits of the next generation of geothermal power plant technology, such as improved condensers and heat exchangers, will spur new development. As much as 100 to 300 megawatts of additional geothermal power to replace combustion-fired facilities will become available at new and existing plants within the next two years.

Fuel cells, a product of America's space program, hold great promise for reducing emissions. As noted in the National Energy Policy, the first generation fuel cells for stationary power applications entered commercial markets in 1995 and the second generation is currently in the demonstration phase. Innovative demonstration projects will reduce the high cost of this technology and offer a great potential to meet our energy needs.

Therefore, President Bush has directed that the National Climate Change Technology Initiative will:

- **Make recommendations for funding demonstration projects** for cutting-edge technologies.

Technology for Measuring and Monitoring Gross and Net Emissions

A fundamental challenge in attracting private sector investment to land-based greenhouse gas emission reduction or carbon sequestration projects is the ability to accurately quantify the net changes. Private sector investors are reluctant to participate in projects without reliable and credible quantification of the uncertainties associated with different land management practices. Cost effective measurement systems will not only increase the attractiveness of agricultural greenhouse gas projects to investors, but can also provide valuable information to individual farmers and ranchers in optimizing the use of fuel, fertilizers and other substances.

Significant advances in the science of remote sensing, coupled with land-based measurements, create new opportunities to monitor and verify greenhouse gas emissions. New and improved sensors that can be mounted on earth observing satellites and high altitude aircraft can deliver a unique capability to regularly monitor greenhouse gases with high accuracy, including carbon dioxide, methane, and ozone. This effort requires collaboration between the federal government and the private sector.

Therefore, President Bush has directed that the National Climate Change Technology Initiative will:

- **Develop improved technologies for measuring and monitoring** gross and net greenhouse gas emissions.

ADVANCING THE SCIENCE OF CLIMATE CHANGE

"MY CABINET-LEVEL WORKING GROUP HAS MET REGULARLY FOR THE LAST TEN WEEKS TO REVIEW THE MOST RECENT, MOST ACCURATE, AND MOST COMPREHENSIVE SCIENCE. THEY HAVE HEARD FROM SCIENTISTS OFFERING A WIDE SPECTRUM OF VIEWS; THEY HAVE REVIEWED THE FACTS, AND THEY HAVE LISTENED TO MANY THEORIES AND SUPPOSITIONS. THE WORKING GROUP ASKED THE HIGHLY RESPECTED NATIONAL ACADEMY OF SCIENCES TO PROVIDE US THE MOST UP-TO-DATE INFORMATION ABOUT WHAT IS KNOWN – AND WHAT IS NOT KNOWN – ON THE SCIENCE OF CLIMATE CHANGE...THE UNITED STATES [WILL] HELP LEAD THE WAY BY ADVANCING THE SCIENCE ON CLIMATE CHANGE."

-- PRESIDENT
GEORGE W. BUSH

Executive Summary

The United States leads the world in climate change research, spending more than the 15 nations of the European Union and Japan combined. Over the past decade, the United States has invested nearly $18 billion in such research and has increased our understanding of changes in climate, human links to these changes, and possible consequences.

To have the most up-to-date information of what is known and unknown about the science of climate change, the Cabinet-level climate change working group requested a report from the National Academy of Sciences (NAS). **The NAS report identified substantial uncertainty in critical areas,** such as:

- The feedbacks in the climate system that determine the magnitude and rate of temperature increases;
- The future usage of fossil fuels and the future emissions of methane;
- How much carbon is sequestered by oceans and other sinks and how much remains in the atmosphere;
- The details of regional climate change resulting from global climate change;
- The nature and causes of the natural variability of climate, its interactions with forced changes, and the direct and indirect effects of aerosols.

The National Academy of Sciences concluded, "[m]aking progress in reducing the large uncertainties in projections of future climate will require addressing a number of fundamental scientific questions relating to the buildup of greenhouse gases in the atmosphere and the behavior of the climate system."

To ensure that policies are shaped, and continue to be shaped, by the best science, President Bush will work aggressively to advance the science of climate change. **Today, the President is announcing the U.S. Climate Change Research Initiative**, which:

- Directs the Secretary of Commerce, **working with other agencies, to set priorities for additional investments in climate change research, to review such investments, and to maximize coordination among federal agencies;**
- Fully funds all priority research areas **that the Secretary of Commerce's**

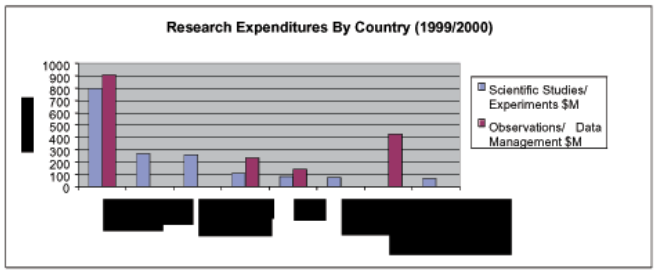
review finds are underfunded or need to be accelerated relative to other research;

- **Challenges the major greenhouse gas emitting countries to increase significantly their investments** in high priority areas of climate change research;
- **Provides up to $25 million**, and calls on other developed countries to provide matching funds, to help build climate observation systems in developing countries; and
- **Proposes a joint venture** with the EU, Japan and others to develop state-of-the-art climate modeling to help us better predict the causes and consequences of climate change.

U.S. Climate Research to Date

U.S. Global Change Research Program

The United States leads the world in climate change research, spending approximately $1.6 billion annually. The United States is responsible for half of the world's annual climate change research expenditures, three times more than the next largest contributor and larger than the contributions of Japan and all 15 nations of the European Union combined.



Source: IGFA National Updates" (IGFA, 2000), NASA, European Space Agency, National Space Development Agency of Japan, Centre National d'Etudes Spatiales

The U.S. Global Change Research Program (USGCRP) is a national research program that coordinates most of the federal government's research on climate change. Definition of the program began under the Reagan Administration; the program became a presidential initiative under President George Bush, and was codified by Congress in the Global Change Research Act of 1990.

Since its establishment in 1990, USGCRP has spent approximately $18 billion. The President's fiscal year 2002 budget requests $1.6 billion for USGCRP. One half of this investment is devoted to climate change science and the other half to associated satellite systems. During its first decade, USGCRP research activities have identified a series of global scale changes, including ozone depletion, climate change, and land cover change. USGCRP has also explored and categorized likely human links to these changes, improved forecasts of the El Nino-Southern

Oscillation, and increased understanding of other climate changes. The USGCRP has also developed and deployed a series of remote sensing satellites that could form the basis of a global environmental observing system, and has developed models to analyze the climate process and produce scenarios of potential future climate change and possible consequences.

The USGCRP currently conducts research and observations in the following areas: Understanding the Earth's Climate System; Composition and Chemistry of the Atmosphere; Global Water Cycle; Carbon Cycle Science; Biology and Biochemistry of Ecosystems; Human Dimensions of Global Change; and Paleoenvironment/Paleoclimate (analysis of prehistoric changes in climate). Ten federal agencies participate in the USGCRP and their respective roles are described in Annex I.

Key Gaps in Science of Climate Change

Despite the United States' intensive investment in climate change science over the past decade, numerous gaps remain in our understanding of climate change. The National Academy of Sciences identified in its report, *Climate Change Science: An Analysis of Some Key Questions (June 2001),* critical uncertainties about the science of climate change. At the most fundamental level, the report indicated the need to better understand the causes of warming. The National Academy of Sciences stated, "Greenhouse gases are accumulating in Earth's atmosphere as a result of human activities, causing surface air temperatures and subsurface ocean temperatures to rise. Temperatures are, in fact, rising. The changes observed over the last several decades are likely mostly due to human activities, but we cannot rule out that some significant part of these changes are also a reflection of natural variability."

The National Academy of Sciences report goes on to identify a range of specific areas of scientific uncertainty that require additional study and research. These gaps include:

- **How much carbon is sequestered by oceans and terrestrial sinks and how much remains in the atmosphere is uncertain:**
  - ✓ **"How land contributes, by location and processes, to exchanges of carbon with the atmosphere is still highly uncertain. . . ." (p. 11)**
  - ✓ **"These estimates [of future carbon dioxide climate forcings] . . . are only approximate because of uncertainty about how efficiently the ocean and terrestrial biosphere will sequester atmospheric CO_2." (p. 13)**
  - ✓ "How much of the carbon from future use of fossil fuels will be seen as increases in carbon dioxide in the atmosphere will depend on what fractions are taken up by land and by the oceans. The exchanges with land occur on various time scales, out to centuries for soil decomposition in high latitudes, and they are sensitive to climate change. Their projection into the future is highly problematic." (p. 18)

- **The feedbacks in the climate system that determine the magnitude and rate of temperature increases are uncertain:**

- ✓ "Because there is considerable uncertainty in current understanding of how the climate system varies naturally and reacts to emissions of greenhouse gases and aerosols, current estimates of the magnitude of future warming should be regarded as tentative and subject to future adjustments (either upward or downward)." (p. 1)

- ✓ "Much of the difference in predictions of global warming by various climate models is attributable to the fact that each model represents these [feedback] processes in its own particular way. These uncertainties will remain until a more fundamental understanding of the processes that control atmospheric relative humidity and clouds is achieved." (p. 4)

➢ **The direct and indirect effects of aerosols are uncertain:**

- ✓ "The greatest uncertainty about the aerosol climate forcing—indeed, the largest of all the uncertainties about global climate forcings—is probably the indirect effect of aerosols on clouds." (p. 14)
- ✓ "The great uncertainty about this indirect aerosol climate forcing presents a severe handicap both for the interpretation of past climate change and for future assessments of climate changes." (p. 14)
- ✓ "Climate forcing by anthropogenic aerosols is a large source of uncertainty about future climate change." (p. 13)
- ✓ "Because of the scientific uncertainties associated with the sources and composition of carbonaceous aerosols, projections of future impacts on climate are difficult." (p. 12)

➢ **The details and impacts of regional climate change resulting from global climate change are uncertain:**

- ✓ "On the regional scale and in the longer term, there is much more uncertainty" with respect to effects on agriculture and forestry. (p. 19)
- ✓ "The Northern Hemisphere as a whole experienced a slight cooling from 1946-75, and the cooling during that period was quite marked over the eastern United States. The cause of this hiatus in the warming is still under debate." (p. 16)
- ✓ "Health outcomes in response to climate change are the subject of intense debate. . . .The understanding of the relationships between weather/climate and human health is in its infancy and therefore the health consequences of climate change are poorly understood. The costs, benefits, and availability of resources for adaptation are also uncertain." (p. 20)
- ✓ "Changes in storm frequency and intensity are one of the more uncertain elements of future climate change prediction." (p. 20)

➢ **The nature and causes of the natural variability of climate and its interactions with forced changes are uncertain:**

- ✓ "Because of the large and still uncertain level of natural variability inherent in the climate record and the uncertainties in the time histories of the various forcing agents (and particularly aerosols), a causal linkage between the buildup of greenhouse gases in

the atmosphere and the observed climate changes during the 20th century cannot be unequivocally established." (p. 17)

- ✓ The value of indirect effect of ozone changes induced by solar ultraviolet irradiance variations "remains highly uncertain." (p. 14)

- **The future usage of fossil fuels and the future emissions of methane are uncertain:**
  - ✓ "With a better understanding of the sources and sinks of methane, it may be possible to encourage practices . . . that lead to a decrease in atmospheric methane and significantly reduce future climate change." (p. 13)
  - ✓ "There is no definitive scientific basis for choosing among several possible explanations for these variations in the rates of change of global methane contributions, making it very difficult to predict its future atmospheric concentrations." (p. 11)

In response to these gaps in our knowledge, **the National Academy of Sciences study also recommends, "research that couples physical, chemical biological and human systems; an improved capability of integrating scientific knowledge, including its uncertainty, into effective decision support systems**, and an ability to conduct research at the regional or sectoral level that promotes analysis of the response of human and natural systems to multiple stresses."

The NAS report also indicates that to advance the understanding of climate change, it will be necessary to have "a global observing system in support of long term climate monitoring and prediction [and] concentration on large-scale modeling through increased, dedicated supercomputing and human resources." In addition to the recent National Academy of Sciences report, the USGCRP has updated its ten-year plan and submitted it to the National Research Council (NRC) for review. High priority areas for further research are identified in numerous recent reports and documents, such as: *"Global Environmental Change: Research Pathways for the Next Decade" (NRC 1998), "Capacity of US Climate Modeling to Support Climate Change Assessment Activities" (NRC, 1998), "Adequacy of Climate Observing Systems" (NRC, 1999),* and others.

Advancing the Science

The National Academy of Sciences report states that an "effective strategy for advancing the understanding of climate change will also require…efforts to ensure that climate research is supported and managed to assure innovation, effectiveness and efficiency." Over the decade of the USGCRP, interagency management of the program has weakened. The National Research Council in its report, *"Global Environmental Change: Research Pathways for the Next Decade" (NRC 1998),* identified the problem, and the USGCRP draft ten-year plan has proposed changes to the management structure. Such issues merit careful and high-level review, in consultation with the Congress.

Therefore, to advance the science of climate change and focus efforts on the many key areas of uncertainty, President Bush will:

- **Direct the Secretary of Commerce, working with other agencies, to set priorities for additional investments in climate change research**, to review such investments, and to maximize coordination among federal agencies.
- **Fully fund all priority research areas** that the review finds are underfunded or need to be accelerated relative to other research. Such areas could include the carbon cycle, climate modeling, and global water cycle.

The United States is making significant investments in the science of climate change and is pledging to accelerate its own research. Climate change is a global problem, however, and other nations must continue to advance the state of scientific knowledge.

The National Research Council, the US Global Change Research Program, and the World Meteorological Organization have all identified the building of a global observing system to monitor climate as being crucial to improving our understanding of the science of climate change. This system must include developing countries that have limited resources to make the necessary measurements.

The United States, Europe, and Japan each have significant climate modeling capabilities. The United States leads the world in the basic science of climate modeling, and Europe and Japan have built dedicated centers for climate modeling with a clearly defined mission.

Therefore, to enhance research, build a global climate observation system, and improve climate modeling, President Bush will:

- **Challenge the major greenhouse gas emitting countries** to increase significantly their investments in high priority areas of climate change research.
- **Provide up to $25 million to help build climate observation systems in developing countries** throughout the world, and call upon other developed countries to provide matching funds for such an investment.
- **Propose a joint venture** with the European Union, Japan and others to develop state-of-the-art climate modeling to help us better predict the causes and consequences of climate change.

Annex I

Agency Roles in the USGCRP

US Department of Agriculture: USDA-sponsored research focuses on understanding terrestrial systems and the effects of global change (including water balance, atmospheric deposition, vegetative quality, and UV-B radiation) on food, fiber, and forestry production in agricultural, forest, and range ecosystems. USDA estimates changes in carbon stocks on forests and agricultural lands and greenhouse gas emissions from agricultural sources, and performs research on how agricultural and forestry activities such as afforestation, changes in tillage practices, and bioenergy can contribute to a reduction in greenhouse gases.

Department of Commerce/National Oceanic and Atmospheric Administration (NOAA): NOAA's ground, ocean, and satellite observations, with an emphasis on oceanic and atmospheric dynamics, circulation, and chemistry, are an important part of the U.S. research program. They have resulted in improvements in climate modeling, prediction, and information management capabilities. NOAA also sponsors a wide range of studies on ocean-land-atmosphere interactions, the global hydrological cycle, and the role of global transfers of carbon dioxide among the atmosphere, ocean and terrestrial biosphere in climate change; the projection and assessment of variability across multiple timescales and the study of the relationship between the natural climate system and society and the development of methodologies for applying climate information to problems of social and economic consequences.

Department of Defense: The Department of Defense continues a history of participation in the USGCRP through sponsored research that concurrently satisfies national security requirements and stated goals of the USGCRP.

Department of Energy: Research supported by DOE's Office of Biological and Environmental Research (BER) addresses the effects of energy production and use on the global Earth system, primarily through studies of climate response. It includes research in climate modeling, atmospheric chemistry and transport, atmospheric properties and processes affecting the Earth's radiation balance and sources and sinks of energy-related greenhouse gases (primarily CO_2). It also includes research on the consequences of atmospheric and climatic changes on ecological systems and resources, critical data needs for the detection and attribution of climate change, tools and methods needed to conduct scientific assessments of climate change, and education and training of scientists and researchers in global change.

National Institutes of Health: Four NIH institutes support research on the health effects of UV and near-UV radiation. Their main objectives include increased understanding of the effects of UV and near-UV radiation exposure on target organs (e.g., eyes, skin, immune system) and of the molecular changes that lead to these effects, and the development of strategies to prevent the initiation or promotion of disease before it is clinically defined. National Institutes of Environmental Health Sciences (NIEHS) supports research on the health effects of chlorofluorocarbon replacement chemicals, including studies on the metabolism and toxicity of hydrochlorofluorocarbons and halogenated hydrocarbons.

Department of the Interior/U.S. Geological Survey (USGS): Research at USGS examines terrestrial and marine processes and the natural history of global change, including the interactions between climate and the hydrologic system. Studies seek to understand the character of past and present environments and the geological, biological, hydrological, and geochemical processes involved in environmental change.

Environmental Protection Agency: EPA's Global Change Research Program is an assessment-oriented program with primary emphasis on understanding the potential consequences of climate variability and change on human health, ecosystems, and socio-economic systems in the United States. This entails: (1) improving the scientific basis for evaluating effects of global change in the context of other stresses and human dimensions (as humans are catalysts of and respond to global change); (2) conducting assessments of the risks and opportunities presented by global change; and (3) assessing adaptation options to improve society's ability to effectively respond to the risks and opportunities presented by global change as they emerge.

National Aeronautics and Space Administration: NASA research efforts in global change involve space-based studies of the Earth as an integrated system, including research and satellite programs studying atmospheric chemistry and ozone; ocean surface winds, tropical precipitation and the global hydrological cycle and climate variability cycle; and the global carbon cycle, ocean biological productivity and land surface vegetation and ecosystems. The space-based activity complements ongoing ground-based research programs in the observation, understanding, and modeling of radiation, climate dynamics, and hydrology and water resources; ecosystem dynamics and biogeochemical cycles; atmospheric chemistry; and the processing, archiving, retrieval, dissemination, and use of global change data. The focus is Earth system science, which involves interdisciplinary research and coupled modeling. Development of algorithms for retrieval of the information content of space-based observations is carried out as part of the flight mission.

National Science Foundation: NSF global change research programs support research and related activities to advance the fundamental understanding of dynamic physical, biological, and socio-economic systems and the interactions among them. The programs encourage interdisciplinary activities with particular focus on Earth system processes and the consequences of change. NSF programs facilitate data acquisition and information management activities necessary for fundamental research on global change, promote the enhancement of models designed to improve our understanding of Earth system processes and interactions, and develop advanced analytic methods to facilitate basic research. NSF also supports fundamental research on the general processes used by organizations to identify and evaluate policies for mitigation, adaptation, and other responses to the challenge of varying environmental conditions.

Smithsonian Institution: The Smithsonian Institution program strives to improve knowledge of the natural processes involved in global climate change, to provide a long-term repository of climate-relevant research materials for present and future studies, and to bring this knowledge to various audiences, ranging from scholarly to lay public. The unique contribution of the Smithsonian Institution is a long-term perspective – e.g., undertaking investigations that may require extended study before producing useful results and conducting observations on

sufficiently long (e.g. decadal) time-scales to resolve human-caused modification of natural variability.
Source: FY2001 edition of "Our Changing Planet" (the USGCRP annual report)

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PROMOTING COOPERATION IN THE WESTERN HEMISPHERE AND BEYOND

"CLIMATE CHANGE – WITH ITS POTENTIAL TO IMPACT EVERY CORNER OF THE WORLD – IS AN ISSUE THAT MUST BE ADDRESSED BY THE WORLD. EVEN WITH THE BEST SCIENCE, EVEN WITH THE BEST TECHNOLOGY, WE ALL KNOW THE UNITED STATES CANNOT SOLVE THIS GLOBAL PROBLEM ALONE. WE ARE BUILDING PARTNERSHIPS WITHIN THE WESTERN HEMISPHERE AND WITH OTHER LIKE-MINDED COUNTRIES."

-- PRESIDENT GEORGE W. BUSH

Executive Summary

Climate change is a global issue that requires a truly global solution. Even with the best science and the most innovative technology, neither the United States nor any other country can solve this problem alone.

That is why **President Bush is directing the Secretary of State, working closely with other agencies, to consult with nations in the hemisphere and throughout the world and identify areas for enhanced cooperation. Specifically, the Secretary of State will**:

- **Build on the recently signed CONCAUSA declaration with Central America**, which calls for "intensified cooperative efforts" on climate change.
- **Strengthen and expand scientific research within the Western Hemisphere**, exploring opportunities presented by the Inter-American Institute for Global Change Research and other potential institutional linkages.
- **Revitalize U.S. efforts to assist developing countries to acquire the tools and expertise needed to measure and monitor emissions**, and to identify and act on priority emissions of both CO_2 and non-$C0_2$ gases.
- **Promote the export of climate-friendly, clean energy technology**, building on recommendations of the President's National Energy Policy.
- **Promote sustainable forest conservation** and land use in the developing world.

A Global Problem

Climate change is a global issue that requires a global solution, embracing developed and developing countries alike. The major greenhouse gas emitting nations include not only industrialized countries such as the United States and Germany, but also developing countries such as China, India, and Indonesia.

Major Emitting Countries

NATION	Total Emissions (Millions of tonnes C per Year)	% of Global Total	Cumulative % of Global Total
1995 Global Total	**6,173**	100%	100%
United States of America	1,407	23%★	23%
China	871	14%	37%
Russian Federation	496	8%	45%
Japan	308	5%	50%
India	248	4%	54%
Germany	228	4%	58%
United Kingdom	148	2%	60%
Ukraine	120	2%	62%
Canada	119	2%	64%
Italy	112	2%	66%
Republic of Korea	102	2%	67%
Mexico	98	2%	69%
France	93	2%	70%
Poland	92	1%	72%
South Africa	83	1%	73%
Indonesia	81	1%	75%

★ Note: When all greenhouse gas emissions are included, the U.S. total is less than 20%.
Source: Oak Ridge National Laboratories, U.S. Department of Energy

Partnerships for Climate Solutions

The United States has partnered on climate change issues through myriad activities with countries throughout the world. For example, through the U.S. Country Studies Program, we have helped 56 countries put together greenhouse gas inventories and action plans in the last eight years. We have worked with countries in Latin America, Asia and Africa to promote land use and forest conservation practices that promote carbon sequestration and other sustainable development goals. Through the Technology Cooperation and Agreement Pilot Project and other clean energy initiatives, the United States has worked with countries throughout the world to identify priority areas for adapting clean technologies in power supply and other sectors. And we have worked throughout the world on projects to reduce air pollution and emissions from non-CO_2 greenhouse gases.

President Bush intends to build on and strengthen our cooperation with countries in these and other areas. Thus, he has directed the Secretary of State, working closely with other agencies, to consult with our international partners and identify areas for cooperation in the Western Hemisphere and beyond.

Partnering in the Western Hemisphere

The Western Hemisphere offers exceptional opportunities for climate change in both the short and long term. The strong commitment to open democratic processes, market economies and sensible environmental solutions, as well as the growing economic ties in the region, provide a strong basis for increased cooperation on climate change.

Expanded CONCAUSA Declaration

As a first step, on June 7, 2001, the Secretary of State signed a Joint Declaration with seven Central American countries that reaffirms and broadens our joint efforts on sustainable development. The Declaration emphasizes "the need for intensified cooperative efforts to address climate change," citing as priority areas for action:

- Scientific research;
- Estimating and monitoring greenhouse gases;
- Investing in forestry conservation;
- Enhancing energy efficiency;
- Promoting environmental technologies;
- Enhancing capacity to adapt to climate change; and
- Collaborating to better understand regional impacts of climate change.

An action plan will be developed based on the declaration, with details to be completed by the time of the U.N. General Assembly meeting in September of this year.

Strengthening Scientific Research in the Western Hemisphere

Countries in the Western Hemisphere have a strong history of cooperation on scientific issues, but the climate challenge demands more. Therefore, the Secretary of State in cooperation with other agencies will seek ways to:

- **Strengthen cooperation on the development and application of regional climate models** to better understand climate "hot-spots" such as the Caribbean monsoon region, the Amazon basin, the influence of the mountains from Alaska to Chile on regional climate, and the El Nino and La Nina phenomena.
- **Support enhanced observations, research, modeling, and application** through institutions such as the Inter-American Institute for Global Change Research and other countries.

Increasing Cooperation Globally

Monitoring, Measurement and Mitigation Assistance

In order for countries to reduce their greenhouse gas emissions, they need basic information about their emissions, which can help prioritize mitigation efforts. Countries' ability to perform these vital tasks has been uneven to date. For example, it has been nearly ten years since the U.N. Framework Convention on Climate Change was established in 1992, yet only one-third of developing countries have submitted information on their emissions. Through the U.S. Country Studies Program, the United States has in the past been a leader in helping developing countries with the tools they need to measure and monitor their emissions, and to identify and act on priority emissions. Therefore, the Department of State, the Environmental Protection Agency and other agencies will:

- **Consider how to build on and substantially strengthen current efforts to cooperate with countries on the crucial tasks of emissions monitoring, measurement and mitigation.** These efforts will have an increased emphasis on effective mitigation of priority sources of CO2 and non-CO2 emissions.

Climate-friendly Technology

Energy use in developing countries is expected to account for three-quarters of the increase in global energy use between now and 2050, and our ability to effectively disseminate and adapt appropriate technologies is key to the climate change effort. Therefore, the United States will:

- **Explore ways of helping countries in the Western Hemisphere and throughout the world build the technical and policy foundations for a cleaner energy future.** This effort will build on the recommendations of the President's National Energy Policy, and will be guided by the strategic plan of the Clean Energy Technology Exports Working Group, a Federal interagency task force chaired by USAID and the Departments of Commerce and Energy.

Land Use and Forest Conservation

Substantial opportunities exist for early and significant reductions in greenhouse gas emissions through effective sequestration efforts in Latin America and elsewhere, with substantial benefits to biodiversity and conservation. Therefore, the United States will:

- Work with others to promote sustainable forest conservation and land use, **including through the Tropical Forest Conservation Act (which facilitates debt swaps with other countries to protect globally and regionally important tropical forests) and the establishment of a process of standardizing methodologies for measuring greenhouse gas reductions from sequestration projects.**

3. STATEMENT OF PRESIDENT GEORGE BUSH (FEBRUARY 14, 2002)

THE WHITE HOUSE
OFFICE OF THE PRESS SECRETARY
For Immediate Release February 14, 2002

REMARKS BY THE PRESIDENT ON CLIMATE CHANGE AND CLEAN AIR

National Oceanic and Atmospheric Administration
Silver Spring, Maryland
2:05 P.M. EST

The President: Thank you very much for that warm welcome. It's an honor to join you all today to talk about our environment and about the prospect of dramatic progress to improve it.

Today, I'm announcing a new environmental approach that will clean our skies, bring greater health to our citizens and encourage environmentally responsible development in America and around the world.

Particularly, it's an honor to address this topic at NOAA, whose research is providing us with the answers to critical questions about our environment. And so I want to thank Connie for his hospitality and I want to thank you for yours, as well. Connie said he felt kind of like Sasha Cohen—I thought for a minute he was going to ask me to talk to his mother on his cell phone.

I also want to tell you one of my favorite moments was to go down to Crawford and turn on my NOAA radio to get the weather. I don't know whether my guy is a computer or a person. But the forecast is always accurate, and I appreciate that. I also want to thank you for your hard work, on behalf of the American people.

I appreciate my friend, Don Evans's leadership. I've known him for a long time. You're working for a good fellow, if you're working at the Commerce Department, or at NOAA. And I want to thank Spence Abraham and Christie Todd Whitman for their service to the country, as well. I've assembled a fabulous Cabinet, people who love their country and work hard. And these are three of some of the finest Cabinet officials I've got.

I want to thank Jim Connaughton, who is the Chairman of the Council on Environmental Quality. He's done a fabulous job of putting this policy together, a policy that I'm about to explain. But before I do, I also want to thank some Members of Congress who have worked with us on this initiative. I want to thank Bob Smith and George Voinovich, two United States senators, for their leadership in pursuing multi-pollutant legislation; as well as Congressmen Billy Tauzin and Joe Barton. And I want to thank Senator Chuck Hagel and Larry Craig for their work on climate issues. These Members of Congress have had an impact on the policies I am just about to announce.

America and the world share this common goal: we must foster economic growth in ways that protect our environment. We must encourage growth that will provide a better life for citizens, while protecting the land, the water, and the air that sustain life.

In pursuit of this goal, my government has set two priorities: we must clean our air, and we must address the issue of global climate change. We must also act in a serious and responsible way, given the scientific uncertainties. While these uncertainties remain, we can begin now to address the human factors that contribute to climate change. Wise action now is an insurance policy against future risks.

I have been working with my Cabinet to meet these challenges with forward and creative thinking. I said, if need be, let's challenge the status quo. But let's always remember, let's do what is in the interest of the American people.

Today, I'm confident that the environmental path that I announce will benefit the entire world. This new approach is based on this common-sense idea: that economic growth is key to environmental progress, because it is growth that provides the resources for investment in clean technologies.

This new approach will harness the power of markets, the creativity of entrepreneurs, and draw upon the best scientific research. And it will make possible a new partnership with the developing world to meet our common environmental and economic goals.

We will apply this approach first to the challenge of cleaning the air that Americans breathe. Today, I call for new Clean Skies legislation that sets tough new standards to dramatically reduce the three most significant forms of pollution from power plants, sulfur dioxide, nitrogen oxides and mercury.

We will cut sulfur dioxide emissions by 73 percent from current levels. We will cut nitrogen oxide emissions by 67 percent. And, for the first time ever, we will cap emissions of mercury, cutting them by 69 percent. These cuts will be completed over two measured phases, with one set of emission limits for 2010 and for the other for 2018.

This legislation will constitute the most significant step America has ever taken—has ever taken—to cut power plant emissions that contribute to urban smog, acid rain and numerous health problems for our citizens.

Clean Skies legislation will not only protect our environment, it will prolong the lives of thousands of Americans with asthma and other respiratory illnesses, as well as with those with heart disease. And it will reduce the risk to children exposed to mercury during a mother's pregnancy.

The Clean Skies legislation will reach our ambitious air quality goals through a market-based cap-and-trade approach that rewards innovation, reduces cost and guarantees results. Instead of the government telling utilities where and how to cut pollution, we will tell them when and how much to cut. We will give them a firm deadline and let them find the most innovative ways to meet it.

We will do this by requiring each facility to have a permit for each ton of pollution it emits. By making the permits tradable, this system makes it financially worthwhile for companies to pollute less, giving them an incentive to make early and cost effective reductions.

This approach enjoys widespread support, with both Democrats and Republicans, because we know it works. You see, since 1995 we have used a cap-and-trade program for sulfur dioxide pollution. It has cut more air pollution, this system has reduced more air pollution in the last decade than all other programs under the 1990 Clean Air Act combined. And by even more than the law required. Compliance has been virtually 100 percent. It takes only a handful of employees to administer this program. And no one had to enter a courtroom to make sure the reductions happened.

Because the system gives businesses an incentive to create and install innovative technologies, these reductions have cost about 80 percent less than expected. It helps to keep energy prices affordable for our consumers. And we made this progress during a decade when our economy, and our demand for energy, was growing.

The Clean Skies legislation I propose is structured on this approach because it works. It will replace a confusing, ineffective maze of regulations for power plants that has created an endless cycle of litigation. Today, hundreds of millions of dollars are spent on lawyers, rather than on environmental protection. The result is painfully slow, uncertain and expensive programs on clean air.

Instead, Clean Skies legislation will put less money into paying lawyers and regulators, and money directly into programs to reduce pollution, to meet our national goal. This approach, I'm absolutely confident, will bring better and faster results in cleaning up our air.

Now, global climate change presents a different set of challenges and requires a different strategy. The science is more complex, the answers are less certain, and the technology is less developed. So we need a flexible approach that can adjust to new information and new technology.

I reaffirm America's commitment to the United Nations Framework Convention and its central goal, to stabilize atmospheric greenhouse gas concentrations at a level that will prevent dangerous human interference with the climate. Our immediate goal is to reduce America's greenhouse gas emissions relative to the size of our economy.

My administration is committed to cutting our nation's greenhouse gas intensity—how much we emit per unit of economic activity—by 18 percent over the next 10 years. This will set America on a path to slow the growth of our greenhouse gas emissions and, as science justifies, to stop and then reverse the growth of emissions.

This is the common sense way to measure progress. Our Nation must have economic growth—growth to create opportunity; growth to create a higher quality of life for our citizens. Growth is also what pays for investments in clean technologies, increased conservation, and energy efficiency. Meeting our commitment to reduce our greenhouse gas intensity by 18 percent by the year 2012 will prevent over 500 million metric tons of greenhouse gases from going into the atmosphere over the course of the decade. And that is the equivalent of taking 70 million cars off the road.

To achieve this goal, our Nation must move forward on many fronts, looking at every sector of our economy. We will challenge American businesses to further reduce emissions. Already, agreements with the semiconductor and aluminum industries and others have dramatically cut emissions of some of the most potent greenhouse gases. We will build on these successes with new agreements and greater reductions.

Our government will also move forward immediately to create world-class standards for measuring and registering emission reductions. And we will give transferable credits to companies that can show real emission reductions.

We will promote renewable energy production and clean coal technology, as well as nuclear power, which produces no greenhouse gas emissions. And we will work to safely improve fuel economy for our cars and our trucks.

Overall, my budget devotes $4.5 billion to addressing climate change—more than any other nation's commitment in the entire world. This is an increase of more than $700 million over last year's budget. Our Nation will continue to lead the world in basic climate and science research to address gaps in our knowledge that are important to decisionmakers.

When we make decisions, we want to make sure we do so on sound science; not what sounds good, but what is real. And the United States leads the world in providing that kind of research. We'll devote $588 million toward the research and development of energy conservation technologies. We must and we will conserve more

in the United States. And we will spend $408 million toward research and development on renewables, on renewable energy.

This funding includes $150 million for an initiative that Spence Abraham laid out the other day, $150 million for the Freedom Car Initiative, which will advance the prospect of breakthrough zero-emission fuel cell technologies.

My comprehensive energy plan, the first energy plan that any administration has put out in a long period of time, provides $4.6 billion over the next 5 years in clean energy tax incentives to encourage purchases of hybrid and fuel cell vehicles, to promote residential solar energy, and to reward investments in wind, solar and biomass energy production. And we will look for ways to increase the amount of carbon stored by America's farms and forests through a strong conservation title in the farm bill. I have asked Secretary Veneman to recommend new targeted incentives for landowners to increase carbon storage.

By doing all these things, by giving companies incentives to cut emissions, by diversifying our energy supply to include cleaner fuels, by increasing conservation, by increasing research and development and tax incentives for energy efficiency and clean technologies, and by increasing carbon storage, I am absolutely confident that America will reach the goal that I have set.

If, however, by 2012, our progress is not sufficient and sound science justifies further action, the United States will respond with additional measures that may include broad-based market programs as well as additional incentives and voluntary measures designed to accelerate technology development and deployment.

Addressing global climate change will require a sustained effort over many generations. My approach recognizes that economic growth is the solution, not the problem. Because a Nation that grows its economy is a Nation that can afford investments and new technologies.

The approach taken under the Kyoto protocol would have required the United States to make deep and immediate cuts in our economy to meet an arbitrary target. It would have cost our economy up to $400 billion and we would have lost 4.9 million jobs.

As President of the United States, charged with safeguarding the welfare of the American people and American workers, I will not commit our Nation to an unsound international treaty that will throw millions of our citizens out of work. Yet, we recognize our international responsibilities. So in addition to acting here at home, the United States will actively help developing nations grow along a more efficient, more environmentally responsible path.

The hope of growth and opportunity and prosperity is universal. It's the dream and right of every society on our globe. The United States wants to foster economic growth in the developing world, including the world's poorest nations. We want to help them realize their potential, and bring the benefits of growth to their peoples, including better health, and better schools and a cleaner environment.

It would be unfair—indeed, counterproductive—to condemn developing nations to slow growth or no growth by insisting that they take on impractical and unrealistic greenhouse gas targets. Yet, developing nations such as China and India already account for a majority of the world's greenhouse gas emissions, and it would be irresponsible to absolve them from shouldering some of the shared obligations.

The greenhouse gas intensity approach I put forward today gives developing countries a yardstick for progress on climate change that recognizes their right to economic development. I look forward to discussing this new approach next week, when I go to China and Japan and South Korea. The United States will not interfere with the plans of any Nation that chooses to ratify the Kyoto protocol. But I will intend to work with nations, especially the poor and developing nations, to show the world that there is a better approach, that we can build our future prosperity along a cleaner and better path.

My budget includes over $220 million for the U.S. Agency for International Development and a global environmental facility to help developing countries better measure, reduce emissions, and to help them invest in clean and renewable energy technologies. Many of these technologies, which we take for granted in our own country, are not being used in the developing world. We can help ensure that the benefits of these technologies are more broadly shared. Such efforts have helped bring solar energy to Bangladesh, hydroelectric energy to the Philippines, geothermal electricity to Kenya. These projects are bringing jobs and environmental benefits to these nations, and we will build on these successes.

The new budget also provides $40 million under the Tropical Forest Conservation Act to help countries redirect debt payments toward protecting tropical forests, forests that store millions of tons of carbon. And I've also ordered the Secretary of State to develop a new initiative to help developing countries stop illegal logging,

a practice that destroys biodiversity and releases millions of tons of greenhouse gases into the atmosphere.

And, finally, my government is following through on our commitment to provide $25 million for climate observation systems in developing countries that will help scientists understand the dynamics of climate change.

To clean the air, and to address climate change, we need to recognize that economic growth and environmental protection go hand in hand. Affluent societies are the ones that demand, and can therefore afford, the most environmental protection. Prosperity is what allows us to commit more and more resources to environmental protection. And in the coming decades, the world needs to develop and deploy billions of dollars of technologies that generate energy in cleaner ways. And we need strong economic growth to make that possible.

Americans are among the most creative people in our history. We have used radio waves to peer into the deepest reaches of space. We cracked life's genetic code. We have made our air and land and water significantly cleaner, even as we have built the world's strongest economy.

When I see what Americans have done, I know what we can do. We can tap the power of economic growth to further protect our environment for generations that follow. And that's what we're going to do.

Thank you.

4. POLICY BOOK ACCOMPANYING PRESIDENTIAL STATEMENT (FEBRUARY 14, 2002)

EXECUTIVE SUMMARY

"Addressing global climate change will require a sustained effort, over many generations. My approach recognizes that sustained economic growth is the solution, not the problem—because a Nation that grows its economy is a Nation that can afford investments in efficiency, new technologies, and a cleaner environment."

PRESIDENT GEORGE W. BUSH.

The President announced a new approach to the challenge of global climate change. This approach is designed to harness the power of markets and technological innovation. It holds the promise of a new partnership with the developing world. And it recognizes that climate change is a complex, long-term challenge that will require a sustained effort over many generations. As the President has said, "The policy challenge is to act in a serious and sensible way, given the limits of our knowledge. While scientific uncertainties remain, we can begin now to address the factors that contribute to climate change."

While investments today in science will increase our understanding of this challenge, our investments in advanced energy and sequestration technologies will provide the breakthroughs we need to dramatically reduce our emissions in the longer term. In the near term, we will vigorously pursue emissions reductions even in the absence of complete knowledge. Our approach recognizes that sustained economic growth is an essential part of the solution, not the problem. Economic growth will make possible the needed investment in research, development, and deployment of advanced technologies. This strategy is one that should offer developing countries the incentive and means to join with us in tackling this challenge together. Significantly, the President's plan will:

- Reduce the Greenhouse Gas Intensity of the U.S. Economy by 18 Percent in the Next Ten Years. Greenhouse gas intensity measures the ratio of greenhouse gas (GHG) emissions to economic output. This new approach focuses on reducing the growth of GHG emissions, while sustaining the economic growth needed to finance investment in new, clean energy technologies. It sets America on a path to slow the growth of greenhouse gas emissions, and—as the science justifies—to stop and then reverse that growth:
- In efficiency terms, the 183 metric tons of emissions per million dollars GDP that we emit today will be lowered to 151 metric tons per million dollars GDP in 2012.
- Existing trends and efforts in technology improvement will play a significant role. Beyond that, the President's commitment will achieve 100 million metric tons of reduced emissions in 2012 alone, with more than 500 million metric tons in cumulative savings over the entire decade.
- This goal is comparable to the average progress that nations participating in the Kyoto Protocol are required to achieve.
- Substantially Improve the Emission Reduction Registry. The President directed the Secretary of Energy, in consultation with the Secretary of Commerce, the Secretary of Agriculture, and the Administrator of the Environmental Protection Agency, to propose improvements to the current voluntary emission reduction registration program under section 1605(b) of the 1992 Energy Policy Act within 120

days. These improvements will enhance measurement accuracy, reliability and verifiability, working with and taking into account emerging domestic and international approaches.

• Protect and Provide Transferable Credits for Emissions Reduction. The President directed the Secretary of Energy to recommend reforms to ensure that businesses and individuals that register reductions are not penalized under a future climate policy, and to give transferable credits to companies that can show real emissions reductions.

• Review Progress Toward Goal and Take Additional Action if Necessary. If, in 2012, we find that we are not on track toward meeting our goal, and sound science justifies further policy action, the United States will respond with additional measures that may include a broad, market-based program as well as additional incentives and voluntary measures designed to accelerate technology development and deployment.

• Increase Funding for America's Commitment to Climate Change. The President's fiscal year 1903 budget seeks $4.5 billion in total climate spending—an increase of $700 million. This commitment is unmatched in the world, and is particularly notable given America's focus on international and homeland security and domestic economic issues in the President's fiscal year 1903 budget proposal.

• Take Action on the Science and Technology Review. The Secretary of Commerce and Secretary of Energy have completed their review of the Federal Government's science and technology research portfolios and recommended a path forward. As a result of their review, the President has established a new management structure to advance and coordinate climate change science and technology research.

• The President has established a Cabinet-level Committee on Climate Change Science and Technology Integration to oversee this effort. The Secretary of Commerce and Secretary of Energy will lead the effort, in close coordination with the President's Science Advisor. The research effort will continue to be coordinated through the National Science and Technology Council in accordance with the Global Change Research Act of 1990.

• The President's fiscal year 1903 budget proposal dedicates $1.7 billion to fund basic scientific research on climate change and $1.3 billion to fund research on advanced energy and sequestration technologies.

• This includes $80 million in new funding dedicated to implementation of the Climate Change Research Initiative (CCRI) and the National Climate Change Technology Initiative (NCCTI) announced last June. This funding will be used to address major gaps in our current understanding of the natural carbon cycle and the role of black soot emissions in climate change. It will also be used to promote the development of the most promising "breakthrough" technologies for clean energy generation and carbon sequestration.

• Implement a Comprehensive Range of New and Expanded Domestic Policies, Including:

• Tax Incentives for Renewable Energy, Cogeneration, and New Technology. The President's fiscal year 1903 budget seeks $555 million in clean energy tax incentives, as the first part of a $4.6 billion commitment over the next 5 years ($7.1 billion over the next 10 years). These tax credits will spur investments in renewable energy (solar, wind, and biomass), hybrid and fuel cell vehicles, cogeneration, and landfill gas conversion. Consistent with the National Energy Policy, the President has directed the Secretary of the Treasury to work with Congress to extend and expand the production tax credit for electricity generation from wind and biomass, to develop a new residential solar energy tax credit, and to encourage cogeneration projects through investment tax credits.

• Business Challenges. The President has challenged American businesses to make specific commitments to improving the greenhouse gas intensity of their operations and to reduce emissions. Recent agreements with the semi-conductor and aluminum industries and industries that emit methane already have significantly reduced emissions of some of the most potent greenhouse gases. We will build upon these successes with new agreements, producing greater reductions.

• Transportation Programs. The Administration is promoting the development of fuel-efficient motor vehicles and trucks, researching options for producing cleaner fuels, and implementing programs to improve energy efficiency. The President is committed to expanding Federal research partnerships with industry, providing market-based incentives and updating current regulatory programs that advance our progress in this important area. This commitment includes expanding fuel cell research, in particular through the "FreedomCAR" initiative. The President's fiscal year 1903 budget seeks more than $3 billion in tax credits over 11 years for consumers to purchase fuel cell and hybrid vehicles. The Secretary of Transportation has asked the congressional leadership to work with him on legislation that would

authorize the Department of Transportation to reform the Corporate Average Fuel Economy (CAFE) program, fully considering the recent National Academy Sciences report, so that we can safely improve fuel economy for cars and trucks.

• Carbon Sequestration. The President's fiscal year 1903 budget requests over $3 billion—a $1 billion increase above the baseline—as the first part of a 10-year (2002–2011) commitment to implement and improve the conservation title of the Farm Bill, which will significantly enhance the natural storage of carbon. The President also directed the Secretary of Agriculture to provide recommendations for further, targeted incentives aimed at forest and agricultural sequestration of greenhouse gases. The President further directed the Secretary of Agriculture, in consultation with the Environmental Protection Agency and the Department of Energy, to develop accounting rules and guidelines for crediting sequestration projects, taking into account emerging domestic and international approaches.

• Promote New and Expanded International Policies to Complement Our Domestic Program. The President's approach seeks to expand cooperation internationally to meet the challenge of climate change, including:

• Investing $25 Million in Climate Observation Systems in Developing Countries. In response to the National Academy of Sciences' recommendation for better observation systems, the President has allocated $25 million and challenged other developed nations to match the U.S. commitment.

• Tripling Funding for "Debt-for-Nature" Forest Conservation Programs. Building upon recent Tropical Forest Conservation Act (TFCA) agreements with Belize, El Salvador, and Bangladesh, the President's fiscal year 1903 budget request of $40 million to fund "debt for nature" agreements with developing countries nearly triples funding for this successful program. Under TFCA, developing countries agree to protect their tropical forests from logging, avoiding emissions and preserving the substantial carbon sequestration services they provide. The President also announced a new agreement with the Government of Thailand, which will preserve important mangrove forest in Northeastern Thailand in exchange for debt relief worth $11.4 million.

• Fully Funding the Global Environmental Facility. The Administration's fiscal year 1903 budget request of $178 million for the GEF is more than $77 million above this year's funding and includes a substantial $70 million payment for arrears incurred during the prior administration. The GEF is the primary international institution for transferring energy and sequestration technologies to the developing world under the United Nations Framework Convention on Climate Change (UNFCCC).

• Dedicating Significant Funds to the United States Agency for International Development (USAID). The President's fiscal year 2003 budget requests $155 million in funding for USAID climate change programs. USAID serves as a critical vehicle for transferring American energy and sequestration technologies to developing countries to promote sustainable development and minimize their GHG emissions growth.

• Pursue Joint Research with Japan. The U.S. and Japan continue their High-Level Consultations on climate change issues. Later this month, a team of U.S. experts will meet with their Japanese counterparts to discuss specific projects within the various areas of climate science and technology, to identify the highest priorities for collaborative research.

• Pursue Joint Research with Italy. Following up on a pledge of President Bush and Prime Minister Berlusconi to undertake joint research on climate change, the U.S. and Italy convened a Joint Climate Change Research Meeting in January 2002. The delegations for the two countries identified more than 20 joint climate change research activities for immediate implementation, including global and regional modeling.

• Pursue Joint Research with Central America. The United States and Central American Heads of Government signed the Central American-United States of America Joint Accord (CONCAUSA) on December 10, 1994. The original agreement covered cooperation under action plans in four major areas: conservation of biodiversity, sound use of energy, environmental legislation, and sustainable economic development. On June 7, 2001, the United States and its Central American partners signed an expanded and renewed CONCAUSA Declaration, adding disaster relief and climate change as new areas for cooperation. The new CONCAUSA Declaration calls for intensified cooperative efforts to address climate change through scientific research, estimating and monitoring greenhouse gases, investing in forestry conservation, enhancing energy efficiency, and utilizing new environmental technologies.

NATIONAL GOAL

The President set a national goal to reduce the greenhouse gas intensity of the U.S. economy by 18 percent over the next 10 years. Rather than pitting economic growth against the environment, the President has established an approach that promises real progress on climate change by tapping the power of sustained economic growth.

• The President's Yardstick—Greenhouse Gas Intensity—is a Better Way to Measure Progress Without Hurting Growth. A goal expressed in terms of declining greenhouse gas intensity, measuring greenhouse gas emissions relative to economic activity, quantifies our effort to reduce emissions through conservation, adoption of cleaner, more efficient, and emission-reducing technologies, and sequestration. At the same time, an intensity goal accommodates economic growth.

• Reducing Greenhouse Gas Intensity by 18 Percent Over the Next Ten Years is Ambitious but Achievable. The United States will reduce the 183 metric tons of emissions per million dollars GDP that we emit today to 151 metric tons per million dollars GDP in 2012. We expect existing trends and efforts in technology improvement to play a significant role. Beyond that, our commitment will achieve 100 million metric tons of reduced emissions in 2012 alone, with more than 500 million metric tons in cumulative savings over the entire decade.

• Focusing on Greenhouse Gas Intensity Sets America on a Path to Slow the Growth of Greenhouse Gas Emissions, and—as the Science Justifies—to Stop and Then Reverse That Growth. As we learn more about the science of climate change and develop new technologies to mitigate emissions, this annual decline can be accelerated. When the annual decline in intensity equals the economic growth rate (currently, about 3 percent per year), emission growth will have stopped. When the annual decline in intensity exceeds the economic growth rate, emission growth will reverse. Reversing emission growth will eventually stabilize atmospheric concentrations as emissions decline.

• As We Advance Science and Develop Technology to Substantially Reduce Greenhouse Gas Emissions in the Long Term, We Do Not Want to Risk Harming the Economy in the Short Term. Over the past 20 years, greenhouse gas emissions have risen with economic growth, as our economy benefited from inexpensive, fossil-fuel based—and greenhouse gas emitting—energy. While new technologies promise to break this emission-economy link, a rapid reduction in emissions would be costly and threaten economic growth. Sustained economic growth is essential for any long-term solution: Prosperity is what allows us to dedicate more resources to solving environmental problems. History shows that wealthier societies demand—and can afford—more environmental protection.

• The Intensity Based Approach Promotes Near-Term Opportunities to Conserve Fossil Fuel Use, Recover Methane, and Sequester Carbon. Until we develop and adopt breakthrough technologies that provide safe and reliable energy to fuel our economy without emitting greenhouse gases, we need to promote more rapid adoption of existing, improved energy efficiency and renewable resources that provide cost-effective opportunities to reduce emissions. Profitable methane recovery from landfills, coal mines and gas pipelines offers another opportunity—estimated by the EPA at about 30 million tons of carbon equivalent emissions. Finally, carbon sequestration in soils and forests can provide tens of millions of tons of emission reductions at very low costs.

• The Intensity Based Approach Advances a Serious, but Measured Mitigation Response. The President recognizes America's responsibility to reduce emissions. At the same time, any long-term solution—one that stabilizes atmospheric concentrations of greenhouse gases at safe levels—will require the development and deployment of new technologies that are not yet cost-effective. The President's policy balances the desire for immediate reductions with the need to protect the economy and to take advantage of developing science and technology.

The President's Goal is Ambitious and Responsible

• Reducing Greenhouse Gas Intensity by 18 Percent Over the Next Ten Years is Comparable to the Average Progress that Nations Participating in the Kyoto Protocol are Required to Achieve. Our goal translates into a 4.5 percent reduction beyond forecasts of the progress that America is expected to make based on existing programs and private activity. Forecasts of the average reductions required by nations implementing the Kyoto Protocol range from zero to 7 percent.

• While Producing Results Similar to What the Kyoto Protocol Participants Are Required to Achieve on Average, the President's Approach Protects the Economy and Develops Institutions for a Long-Term Solution. The focus on greenhouse gas intensity separates the goal of reducing emissions from the potential economic harm associated with a rigid emission cap. By measuring greenhouse gas emissions relative to economic activity, we have a solid yardstick against which we can measure

progress as we pursue a range of programs to reduce emissions. As we develop technologies to produce more goods with fewer greenhouse gas emissions, this yardstick does not penalize economic growth.

• Greenhouse Gas Intensity Is a More Practical Way to Discuss Goals with Developing Countries. The close connection between economic growth, energy use and greenhouse gas emissions implies that fixed appropriate emission limits are hard to identify when economic growth is uncertain and carbon-free, breakthrough energy technologies are not yet in place. Such targets are also hard to identify for developing countries where the future rate of emissions is even more uncertain. Given its neutrality with regard to economic growth, greenhouse gas intensity solves or substantially reduces many of these problems.

Enhanced National Registry for Voluntary Emissions Reductions

The Administration will improve the current Federal GHG Reduction and Sequestration Registry that recognizes greenhouse gas reductions by non-governmental organizations, businesses, farmers, and the Federal, State and local governments. Registry participants and the public will have a high level of confidence in the reductions recognized by this Registry, through capture and sequestration projects, mitigation projects that increase energy efficiency and/or switch fuels, and process changes to reduce emissions of potent greenhouse gases, such as methane. An enhanced registry will promote the identification and expansion of innovative and effective ways to reduce greenhouse gases. The enhanced registry will encourage participation by removing the risk that these actions will be penalized—or inaction rewarded—by future climate policy.

• Improve the Quality of the Current Program. A registry is a tool for companies to publicly record their progress in reducing emissions, providing public recognition of a company's accomplishments, and a record of mitigation efforts for future policy design. This tool goes hand-in-hand with voluntary business challenges, described below, by providing a standardized, credible vehicle for reporting and recognizing progress.

• Although businesses can already register emission reductions under section 1605(b) of the 1995 Energy Policy Act, participation has been limited.

• The President directed the Secretary of Energy, in consultation with the Secretary of Commerce, Secretary of Agriculture, and the Administrator of the Environmental Protection Agency, to propose improvements to the current voluntary emissions reduction registration program within 120 days.

• These improvements will enhance measurement accuracy, reliability and verifiability, working with and taking into account emerging domestic and international approaches.

• Protect and Provide Transferable Credits for Emissions Reduction. The President directed the Secretary of Energy to recommend reforms to ensure that businesses and individuals that register reductions are not penalized under a future climate policy, and to give transferable credits to companies that can show real emissions reductions. These protections will encourage businesses and individuals to pursue innovative strategies to reduce or sequester greenhouse gas emissions, without the risk that future climate policy will disadvantage them.

• Background on Current Registry Program. The Energy Policy Act of 1992 directed the Department of Energy (with EIA as the implementing agency) to develop a program to document voluntary actions that reduce emissions of greenhouse gases or remove greenhouse gases from the atmosphere.

• Under the Energy Policy Act, EIA was directed to issue "procedures for the accurate reporting of information on annual reductions of greenhouse gas emissions and carbon fixation achieved through any measures, including fuel switching, forest management practices, tree planting, use of renewable energy, manufacture or use of vehicles with reduced greenhouse gas emissions, appliance efficiency, methane recovery, cogeneration, chlorofluorocarbon capture and replacement, and power plant heat rate improvement."

• In 1999, 207 companies and other organizations, representing 24 different industries or services, reported on 1,722 projects that achieved 226 million metric tons of carbon dioxide equivalent reductions—equal to 3.4 percent of national emissions. Participating companies included Clairol, AT&T, Dow Chemical, Johnson & Johnson, IBM, Motorola, Pharmacia, Upjohn, Sunoco, Southern, General Motors and DuPont.

• EIA released a February 2002 report demonstrating that this program continues to expand. In 2000, 222 companies had undertaken 1,882 projects to reduce or sequester greenhouse gases. These achieved 269 million metric tons of carbon dioxide equivalent reductions—equal to 3.9 percent of national emissions.

• A number of proposals to reform the existing registry—or create a new registry—have appeared in energy and/or climate policy bills introduced in the past year. The Administration will fully explore the extent to which the existing authority under the Energy Policy Act is adequate to achieve these reforms.

Progress Check in 2012

The domestic programs proposed by the President allow consumers and businesses to make flexible decisions about emission reductions rather than mandating particular control options or rigid targets. If, however, by 2012, our progress is not sufficient, and sound science justifies further action, the United States will respond with additional measures that may include a broad, market-based program, as well as additional incentives and voluntary measures designed to accelerate technology development and deployment.

DOMESTIC INITIATIVES

Summary

Key domestic initiatives to contribute to achieving our goal:

• Tax Incentives for Renewables and Cogeneration. The Administration's fiscal year 2003 budget proposal seeks $4.6 billion in clean energy tax incentives over the next 5 years. These tax credits will spur investments in renewable energy (solar, wind, and biomass), hybrid and fuel cell vehicles, cogeneration, and landfill gas. As directed in the National Energy Policy, the Secretary of the Treasury will work with Congress to extend and expand the production tax credit for electricity generation from wind and biomass, to develop a new residential solar energy tax credit, and to encourage cogeneration projects through investment tax credits.

• Business Challenges. The President challenges American businesses and industries to reduce emissions. Already, agreements with the semi-conductor and aluminum industries, and industries that emit methane, have dramatically reduced emissions of some of the most potent greenhouse gases. We will build on these successes, with broader agreements and greater reductions.

• Transportation Programs. The Administration is promoting the development of fuel-efficient motor vehicles and trucks, researching options for producing cleaner fuels, and implementing programs to improve energy efficiency. The President is committed to expanding Federal research partnerships with industry, market-based incentives and updating current regulatory programs that advance our progress in this important area. The Administration has expanded fuel cell research, such as the "FreedomCAR" initiative, and the President's 1903 budget seeks more than $3 billion in tax credits over 11 years for consumers to purchase fuel cells and hybrid vehicles. The Secretary of Transportation has asked the congressional leadership to work with him on legislation that would authorize the Department of Transportation to reform the Corporate Average Fuel Economy (CAFE) program, fully considering the recent National Academy Sciences report, so that we can safely improve fuel economy for cars and trucks.

• Carbon Sequestration. The President's fiscal year 1903 budget requests over $3 billion—a $1 billion increase above the baseline—as the first part of a 10-year (2002–2011) commitment to implement and improve the conservation title of the Farm Bill, which will significantly enhance the natural storage of carbon. The President also directed the Secretary of Agriculture to provide recommendations on further, targeted incentives for forest and agricultural sequestration of greenhouse gases. The President further directed the Secretary of Agriculture, in consultation with the Environmental Protection Agency and the Department of Energy, to develop accounting rules and guidelines for crediting sequestration projects, taking into account emerging domestic and international approaches.

Incentives and Programs for Renewables and Industrial Cogeneration

The President's fiscal year 1903 budget proposes providing $4.6 billion in clean energy tax incentives over the next 5 years ($7.1 billion over 10 years) for investments in renewable energy (solar, wind, and biomass), hybrid and fuel cell vehicles, co-generation, landfill gas conversion, and ethanol. These incentives are important to meeting the nation's long-term energy supply and security needs, and reducing pollution and projected greenhouse gas emissions. These clean energy tax incentives include:

• New 10 Percent Tax Credit for Co-Generation (Combined Heat and Power Systems). The President has proposed a new 10 percent tax credit for investments in combined heat and power systems between 2002 and 2006. The credit will encourage investments in highly efficient CHP projects and spur innovation in improved CHP technologies. No income tax credits are currently available for investment in CHP property.

• Cogeneration. Combined heat and power (CHP), also known as "co-generation", is a highly efficient form of electric generation that recycles heat which is normally lost under traditional power combustion methods. CHP captures the heat left over from industrial use, providing a source of residential and industrial heating and air conditioning in the local area around the power plant. CHP systems achieve a greater level of overall energy efficiency, thereby reducing energy consumption, costs, and carbon emissions.

• EPA Combined Heat and Power Partnership. The new tax credit would enhance efforts underway by the Environmental Protection Agency to streamline the permitting process for cogeneration plants, promote their location in brownfields and other industrial sites, and clarify how companies can use cogeneration to stay in compliance with Clean Air Act pollution standards. On October 5, 2001, in partnership with 17 Fortune 500 companies, city and State governments and nonprofits, EPA announced the Combined Heat and Power Partnership. Current CHP projects of the founding partners represent more then 5,800 megawatts of power generating capacity, an amount capable of serving almost 6 million households. The projects annually reduce carbon dioxide by more than 8 million tons; the annual energy savings equal 19 million barrels of oil. A similar program by the Department of Energy challenges the heat and power industry to double usage of cogeneration in the United States by 2010.

• First-Ever Tax Credit for Residential Solar Energy Systems. The President has proposed a new 15 percent tax credit for individuals who purchase photovoltaic equipment or solar water heating systems used in a residence, up to a maximum credit of $2,000 for each type of equipment. Currently, no credit is available for noncommercial purchases of solar energy equipment. The credit would be available for photovoltaic equipment purchased between 2002 and 2007, and for solar water heating equipment purchased between 2002 and 2005. This credit will encourage businesses and homeowners to invest in solar power systems.

• Expanded Tax Credit for Electricity Produced from Wind or Biomass. The President has proposed extending and modifying the tax credit for electricity produced from wind or biomass. Currently, wind energy accounts for 6 percent of renewable electricity generation and 0.1 percent of total electricity supply. Advances have helped cut costs by more than 80 percent during the last 20 years. This proposal would help make electricity produced from wind and biomass competitive with other sources of electricity supply. The proposal would:

• Extend for 3 years (2002–2004) the present 1.7 cent-per-kilowatt hour credit for electricity produced from wind and closed-loop biomass (plants grown exclusively to produce electricity); and

• Expand eligible biomass sources to include certain biomass from forest-related resources, agricultural and other sources. For existing biomass facilities, the credit for electricity produced from new sources is 1.0 cent-per-kilowatt hour for 3 years (2002–2004) of production. For coal fired facilities, electricity produced from co-firing biomass from new sources is 0.5 cent-per-kilowatt hour for 3 years of production (2002–2004).

• Tax Credit for New Methane Landfill Projects. The President has proposed encouraging the development of a new alternative source of energy by providing tax credits for energy produced from landfill gas. The credit would be approximately 1.0 cent-per-kilowatt hour (or the equivalent in dollars per million metric BTU) for energy produced from methane from landfills regulated by the EPA to collect and flare methane, and 1.5 cents-per-kilowatt hour for unregulated landfills. The credit would be available for energy produced from new facilities through 2010.

• New Tax Credit for New Hybrid or Fuel-Cell Vehicles. The President has proposed a new temporary tax credit of up to $4,000 for the purchase of new hybrid vehicles and up to $8,000 for the purchase of fuel cell vehicles between 2002 and 2007. These credits would be available for all qualifying light vehicles, including cars, minivans, sport utility vehicles, and light trucks. The tax credits will encourage the purchase of highly fuel-efficient vehicles that incorporate advanced automotive technologies and will help to move hybrid and fuel cell vehicles from the laboratory to the highway.

• Increased Funding for Geothermal Energy. The President's 2003 budget proposal for the U.S. Geological Survey (USGS) supports alternative, non-fossil fuel energy development. The budget includes an increase for USGS to investigate the nature and extent of geothermal systems and produce updated assessments of available geothermal energy resources in selected regions of the United States. The near-term focus of this effort will be in the Great Basin region, where most of the public land available for geothermal leasing lies. This region encompasses most of Nevada and large portions of California, Oregon, Idaho, and Utah. Available data indicate the presence of a substantial undeveloped geothermal energy resource that could be

tapped to help provide for the growing energy requirements of the western United States.

• Increased Funding for Renewable Energy Resources on Public Lands. The President's 1903 budget proposal calls for a major effort by the Bureau of Land Management (BLM) to increase its renewable energy activities in support of the President's National Energy Policy. In 2003, BLM will encourage the study, exploration, and development of renewable energy resources from public lands. Emphasis will be directed to advancing the use of geothermal, hydropower, wind, solar, and biomass resources.

Business Challenges

The President challenged American businesses and industries to reduce greenhouse gas emissions. Already, agreements with the semi-conductor and aluminum industries, and with industries that emit methane, are dramatically reducing emissions of the most potent greenhouse gases. The President's plan will build on these successes, with broader agreements and greater reductions.

Company Challenges

• EPA's "Climate Leaders" Initiative: EPA will launch a new, voluntary Climate Leaders program with a group of major companies including: Florida Power and Light, GM, Lockheed Martin, Miller Brewing Company, Bethlehem Steel, Interface Inc., SC Johnson and Holcimus Inc. These companies have agreed to test new greenhouse gas reporting guidelines as the basis for agreeing to targets in the future. Each participant will establish an individual goal for reducing greenhouse gas emissions, and will voluntarily report those emissions. The Climate Leaders program provides a significant opportunity to achieve the greenhouse gas intensity reductions set forth in this policy through a voluntary approach. In the coming months, the Administration will aggressively pursue additional corporate partners representing a wider spectrum of the U.S. economy.

Sector Challenges

• Semiconductors: On March 13, 2001, EPA and the Semiconductor Industry Association signed a new voluntary agreement, the PFC Reduction Climate Partnership. Under this partnership, the industry agreed to reduce emissions of perfluorocarbons (PFCs) by 10 percent from 1995 levels by the end of 2010. The expected reduction of 13.7 million metric tons of carbon dioxide equivalent in 2010 alone is comparable to taking 12 million cars off the road. PFCs have, on average, 10,000 times the potency of carbon dioxide over 100 years, and persist in the atmosphere 2,000 to 50,000 years.

• Aluminum: Twelve of the 13 U.S. primary aluminum producers, representing 96 percent of the U.S. primary aluminum production capacity, have joined EPA's Voluntary Aluminum Industrial Partnership. Companies participating in this program have committed to make reductions in two potent PFCs, tetrafluoromethane (CF4) and hexafluoroethane (C2F6). The program met its 2000 goal to reduce PFC emissions from U.S. primary aluminum smelting by 45 percent—equivalent to 1.8 million metric tons of carbon—using cost-effective approaches that make economic and environmental sense for the partners.

• Methane: Because of the potency of methane relative to carbon dioxide, a "methane-first" strategy for greenhouse gas mitigation is cost-effective. A variety of U.S. industry and government partnerships have reduced methane emissions, and they are expected to hold emissions at or below 1990 levels through and beyond 2010. Partners in EPA's methane programs are projected to maintain emissions below 1990 levels through 2010.

• EPA's Natural Gas STAR program includes companies representing 40 percent of the U.S. natural gas production, 72 percent of transmission company pipeline miles, 49 percent of distribution company service connections, and 23 percent of processing throughput. This partnership has achieved significant reductions. In 2000, EPA estimates a reduction in methane emissions of 4 million metric tons of carbon equivalent, and projects for 2010 a reduction of 6 million metric tons of carbon equivalent.

• EPA's Coalbed Methane Outreach Program (CMOP) encourages industry to reduce methane emissions from underground coal mines. The program provides technical assistance to mining companies on technologies for recovered methane. EPA estimates that CMOP reduced 2 million metric tons carbon equivalent in 2000.

• In the agriculture sector, USDA and EPA have partnered on the Ag-STAR program and the Ruminant Livestock Efficiency Program (RLEP), which focus on reducing methane emissions. The overall impact of these two programs on greenhouse gas emissions has been small on a national scale, but program stakeholders in the

agricultural community have demonstrated that the practices can reduce greenhouse gas emissions and increase productivity.

Improving Fuel Economy

Developing new technologies to improve the energy efficiency of transportation in the United States will be a key element in achieving future reductions in greenhouse gas emissions. Cars, trucks, aircraft and other parts of the nation's transportation system are responsible for about one-third of the carbon dioxide emissions in the United States. The Administration is currently promoting the development of fuel-efficient motor vehicles and trucks, researching options for producing cleaner fuels, and implementing programs to improve energy efficiency. The President is committed to the expansion and improvement of Federal research partnerships with industry, market-based incentives, and reforming current regulatory programs that advance our progress in this important area.

- The "FreedomCAR"—Advancing Hydrogen-Based Fuel Cells. On January 9, 2002, Energy Secretary Abraham, with the heads of General Motors, Ford Motor Co. and the Chrysler arm of DaimlerChrysler, announced a new partnership, FreedomCAR (Cooperative Automotive Research), to promote the development of hydrogen as the primary fuel for cars and trucks. The "FreedomCAR" program embraces the long-term strategic goal of developing a new breakthrough technology—the hydrogen-powered fuel cell—with a vision of ultimately eliminating our reliance on foreign oil.
- The Department Of Energy's Public-Private Projects for Low-Cost, Breakthrough Fuel Cell Technology. In August 2002, Energy Secretary Abraham announced new partnerships, totaling $500 million, with Honeywell, Siemens, Westinghouse Power Corporation, Delphi Automotive Systems, Battelle, Cummins Power Generation, and McDermott Technologies. The partnerships build upon President Bush's commitment to fuel cell research and cutting edge technologies. The goal of this initiative is to cut the costs of fuel cells to as low as one-tenth the cost of currently marketed systems and to one-third the cost of the more advanced concepts now beginning to reach commercial readiness.
- Tax Credits for New Hybrid or Fuel Cell Vehicles. The President has proposed a new temporary tax credit of up to $4,000 for the purchase of new hybrid vehicles and up to $8,000 for the purchase of fuel-cell vehicles between 2002 and 2007. These credits would be available for all qualifying light vehicles, including cars, minivans, sport utility vehicles, and light trucks. The tax credits will encourage the purchase of highly fuel-efficient vehicles that incorporate advanced automotive technologies and will help to move hybrid and fuel cell vehicles from the laboratory to the highway.
- Corporate Average Fuel Economy Standards (CAFE). A key recommendation of the President's National Energy Policy directed the Secretary of Transportation to review and provide recommendations on establishing updated CAFE standards, with due consideration of the July 2001 National Academy of Sciences (NAS) report. The NAS report included several recommendations pertaining to options for structuring the CAFE system, including permitting manufacturers to trade fuel economy credits.
- The Administration supports increasing automobile fuel economy and encouraging new technologies that reduce our dependence on imported oil, while protecting passenger safety and jobs.
- On February 1, 2002, Transportation Secretary Mineta asked the congressional leadership to "work . . . on legislation that would authorize the Department of Transportation to reform the CAFE program, fully considering the NAS report. Possible reforms include: (1) adopting fuel economy targets that are dependent on vehicles attributes, such as vehicles weight, that inherently influence fuel use and have minimal adverse safety consequences; (2) utilizing market-based incentives, such as trading of fuel economy credits, to obtain fuel savings at the lowest possible cost to consumer while providing continuous incentives for additional fuel economy enhancement; (3) encouraging development and implement of new technologies; and (4) establishing realistic, long-term targets and deadlines to increase economy safely while providing greater long-term product planning for vehicles manufacturers."
- On July 10, 2001, Transportation Secretary Mineta urged Congress to lift the appropriations ban on new rulemaking of CAFE standards by the National Highway Transportation Safety Administration (NHTSA) "to improve vehicle fuel efficiency standards." In December 2001, Congress responded by lifting the ban, and last week NHTSA initiated a public review process for safely improving the fuel economy of new light truck standards for model year 2005 through 2010, and for reforming the CAFE program.

• Tire Pressure Monitoring Systems (TPMS). The Department of Transportation's National Highway Transportation Safety Administration (NHTSA) will finalize this year a rule requiring the installation of tire pressure monitoring systems (TPMSs) in all new cars and light trucks. Properly inflated tires improve fuel efficiency and reduce maintenance costs. NHTSA estimates that the annualized benefits range from $120–480 million in fuel savings and $75–165 million in reduced tread wear. NHTSA predicts TPMS will save between .31 and 1.27 million metric tons of carbon equivalent per year when applied to the entire on-road fleet. That reflects between 128 and 528 million gallons of gasoline per year.

• First-Ever EPA Agreement with Ford to Develop High-Efficiency Auto Technology. In September 2001, EPA agreed to license to the Ford Motor Company a unique, high-efficiency "hydraulic hybrid" technology that has the long-term potential to reduce energy consumption and greenhouse gas emissions. The first application of this technology, planned for model year 2005, will result in a minimum 30 percent improvement in vehicle fuel economy; the second phase, planned for as early as year 2009, should double the fuel economy of selected new vehicles. This is the first-ever licensing agreement between EPA and an automobile company involving vehicle powertrain technology.

Promoting Domestic Carbon Sequestration

In the agriculture sector, activities including fertilizer use, animal waste management and on-farm fuel use account for 148 million metric tons of carbon equivalent emissions, about 8 percent of total U.S. greenhouse gas emissions. The President's fiscal year 2003 budget requests $3 billion above the base-line over 10 years (2002–2011) for a new, conservation-focused Farm Bill that will enhance the natural storage of carbon dioxide.

Increased Funding for USDA's Conservation Programs:

• The Conservation Reserve Program (CRP) assists farm owners and operators to conserve and improve soil, water, air and wildlife resources by removing environmentally sensitive land from agricultural production and keeping it under long-term resource-conserving cover. Currently, USDA estimates that the CRP removes nearly 34 million acres of environmentally sensitive cropland from production, which generates long-term environmental benefits, including the annual savings of about 15 million metric tons of carbon emissions per year. The CRP would expand to 40 million acres, saving roughly 19 million metric tons of carbon per year. The Administration's fiscal year 1903 budget proposes an increase of $89 million over the fiscal year 1902 enacted level.

• The Environmental Quality Incentives Program (EQIP) helps producers make beneficial and cost-effective changes to cropping and grazing systems; improve manure, nutrient and pest management, and implement conservation measures to improve soil, water, and related natural resources. USDA estimates that the EQIP program (in combination with conservation technical assistance) provides assistance to farmers for planning and implementing soil and water conservation practices and removes roughly 12 million metric tons of carbon per year. The Administration's fiscal year 2003 proposes an increase of $800 million over the fiscal year 1902 enacted level.

• The Wetland Reserve Program (WRP) has enrolled just over 1 million acres to date. Under current authority, the program is capped at 1,075,000 acres, and has already reached that level this year. Estimated soil carbon sequestration resulting from conversion of cropland on wetland soils to grassland or forest by 1997 (1.4 million acres) has resulted in carbon sequestration rates of over 2 million metric tons of carbon per year. The Administration has supported a version of the Farm Bill that would expand the WRP to 2.225 million acres, saving roughly 4 million metric tons of carbon per year. The Administration's fiscal year 1903 proposes an increase of $176 million over the fiscal year 1902 enacted level.

• The Forest Stewardship Program provides technical and financial assistance to nonindustrial, private forest owners. About 147 million hectares of U.S. forests are nonindustrial, private forestlands and provide many ecological and economic benefits and values. These forests provide about 60 percent of our nation's timber supply, with increases expected in the future. The acceleration of tree planting on nonindustrial, private forestlands and marginal agricultural lands can help meet resource needs and provide important ancillary benefits that improve environmental quality, such as wildlife habitat, soil conservation, water quality protection and improvement, and recreation. Additionally, tree planting and forest management increases uptake of carbon dioxide and the storage of carbon in living biomass, soils, litter, and long-life wood products. The Forest Service, in cooperation with State forestry agencies, manages both programs, and estimates that these programs provide 700,000 metric tons of carbon reductions per year. The Administration's fiscal year

1903 budget proposes an increase of $16 million over the fiscal year 1902 enacted level.

PROMOTE NEW AND EXPANDED INTERNATIONAL POLICIES

Summary

The President's approach will actively pursue the integration of our domestic goals and policies with those of other nations. The President has submitted provisions in the fiscal year 1903 budget includes:

• Tripling Funding for "Debt-For-Nature" Programs. Building upon recent Tropical Forest Conservation Act (TFCA) agreements with Belize, El Salvador, and Bangladesh, the President's fiscal year 1903 budget request of $40 million to fund "debt for nature" agreements with developing countries nearly triples funding for this highly successful program. The President also announced a new deal with the Government of Thailand, which will preserve important mangrove forest in Northeastern Thailand in exchange for debt relief worth $11.4 million.

• Investing $25 Million in Climate Observation Systems in Developing Countries. In response to the National Academy of Sciences' recommendation for better observation systems, the President has allocated $25 million and challenged other developed nations to match the U.S. commitment.

• Expanding Technology Transfer and Capacity Building in the Developing World:

• Fully Funding the Global Environment Facility (GEF). The President's fiscal year 1903 budget requests $178 million for the GEF, a $77 million increase, which includes a substantial $70 million payment for arrears incurred during the prior Administration. These funds will support transfer of advanced energy and sequestration technologies to the developing world.

• Dedicating Significant Funds to the United States Administration on International Development. The President's 1903 budget requests $155 million in funding for USAID climate change programs. USAID serves as a primary vehicle for transferring American energy and sequestration technologies to developing countries to promote sustainable development and minimize their GHG emissions growth.

• Building on International Cooperative Agreements:

• Joint Research with Japan. The U.S. and Japan continue their High-Level Consultations on climate change issues. Later this month, a team of U.S. experts will meet with their Japanese counterparts to discuss specific projects within the various areas of climate science and technology, to identify the highest priorities for collaborative research.

• Joint Research with Italy. The U.S. and Italy have identified more than 20 joint climate change research activities for immediate implementation and more topics for further development in critical areas of global and regional climate modeling, atmospheric studies related to climate, carbon cycle research, low-carbon technologies and other related areas.

Increased Funding for Tropical Forest Conservation

The Tropical Forest Conservation Act (TFCA) reflects America's commitment to preserving tropical forests worldwide. Created in 1998 and reauthorized in 2001 with broad bipartisan support, the program offers eligible countries the opportunity to reduce their debt to the United States while preserving their tropical forests. TFCA encourages and empowers local communities and nongovernmental organizations to develop and implement grassroots solutions to conservation problems. Grants from the local fund can be used to support a wide range of activities, such as training programs to increase the capacity of individuals and organizations involved in forest conservation areas; restoration of forested areas; and the protection of parks and other protected areas. The President's 2003 budget proposal seeks $50 million in funding for tropical forestry conservation, of which $40 million may be used for TFCA.

Estimates of the carbon sequestration value of tropical forests suggest a wide range of values. The World Resources Institute estimates that carbon sequestration value ranges from 6 to 72 tons per acre of rainforest. The 1995 IPCC report further analyzed the global potential for carbon storage. Slowing tropical deforestation on 700 million hectares (nearly the size of the US, but only 17 percent of the global forest area) could store 60 to87 million gigatons of carbon in 55 years. Annual carbon storage could be over two gigatons by 2050, about 14 percent of projected emissions.

• Agreements During the Bush Administration. TFCA agreements have been negotiated with Belize, El Salvador, and Thailand during this administration.

• Leverage. The four TFCA agreements to date—Bangladesh, Belize, El Salvador, and Thailand—generate approximately $40 million in forest conservation funding at a cost of $19.2 million.

• Bangladesh. Debt reduction agreement signed September 12, 2000; saves Bangladesh $10 million in hard currency payments and will generate $8.5 million in local currency interest payments for tropical forest conservation of Sundarban mangrove forests, which shields the coastline from typhoons and provides habitat for the last genetically viable population of Royal Bengal tigers.

• Belize. In August, 2001, the U.S. and Belize concluded a "debt-for-nature" agreement to protect 23,000 acres of tropical forests. The agreement leveraged $1.3 million in private finds raised by The Nature Conservancy.

• El Salvador. Debt reduction agreement signed July 12, 2001; Tropical Forestry Agreement signed September 14, 2001. Reduced country's official debt to the U.S. by $3 million, generating $14.3 million for tropical forest conservation in local currency interest payments. Initial target of TFCA funds will be reforestation of hillsides.

• Thailand. Debt reduction agreement signed September 19, 2001; agreement was approved by the Thai Cabinet on February 12, 2002. Debt agreement saves Thailand's $11.4 million in hard currency payments and will generate $9.5 million for conservation activities. Initial targets for TFCA funds include reforestation projects in northeastern Thailand, protection of mangrove forests.

Expanding Technology Transfer and Capacity Building in Developing Countries

The President' fiscal year 1903 budget significantly expands funding for current programs that transfer advanced energy and sequestration technologies to developing countries, and provide technical assistance and training to their citizens. Eighty-one percent of the growth in global carbon emissions from fossil fuel use in 1990–2010 is expected to come from developing countries, according to projections by the Energy Information Administration. Reducing this projected, exponential growth of emissions in developing countries therefore must be a critical element of any rational policy to address global climate change. First, the "breakthrough" technological advances achieved under the President's National Climate Change Technology Initiative will benefit all nations, and will not be confined to applications in the United States. Second, America will increase its commitment to helping the developing world gain access to advanced energy efficiency and sequestration technologies, by reinvigorating and expanding support for existing technology transfer programs.

• Investing $25 Million in Climate Observation Systems in Developing Countries. In response to the National Academy of Sciences' recommendation for better observation systems, the President has allocated $25 million and challenged other developed nations to match the U.S. commitment.

• Fully Funding the Global Environment Facility (GEF). The U.S. contribution to the GEF and leading a robust, multinational 5-year replenishment commitment.

• The Administration's Fiscal Year 1903 budget requested $178 million in funding for the GEF, a 77 percent increase over the fiscal year 1902 enacted level of $100.5 million. It includes $107.5 million to fully fund the first installment of the U.S. pledge of $430 million to the GEF's "Third Replenishment" (GEF–3) for 2003–2006. The fiscal year 1903 budget also includes $70 million to clear one-third of the $211 million arrears balances incurred by the United States during the last Administration.

• The GEF fulfills a critical role in improving the environment globally, particularly in financing developing countries' ability to address environmental issues relating to climate change, biodiversity conservation, and land degradation. The GEF, operating as the United Nation's Framework Convention on Climate Change's primary "financial mechanism," funds the extra costs (over normal development costs) of reducing greenhouse gas emissions in energy and other projects. The GEF's project portfolio has demonstrated a wide range of approaches to promoting energy efficiency and renewable energy, often through initiatives in partnership with the private sector. GEF grant projects are implemented at the country level through the World Bank, U.N. Development Program, U.N. Environment Program and regional development banks.

• Since beginning regular operations in 1994, the GEF has designed and implemented over 800 projects in 160 countries. The GEF has committed $3.2 billion to date, leveraging well over $8 billion from other sources. Co-financiers include the developing countries themselves, bilateral aid agencies and other multilateral financial institutions, NGO's and the private sector. Leveraging for clean energy projects is often as high as $5 from other sources for every GEF dollar. U.S. companies are

the largest beneficiaries of contracts extended for GEF projects, securing 30 percent of all contracts.

• Recent examples of highly successful GEF projects include:

• Mexico. The Mexico High Efficiency Lighting Project under which Mexican consumers and businesses have installed almost 40 percent more efficient lights than originally projected;

• India. The India Alternate Energy Project promoting investment in 41 megawatts of wind power through the provision of low-market loans, stimulating massive followup investment with wind power now supplying 850 megawatts of energy in India;

• Brazil. The Brazil Biomass Power Commercial Demonstration Project promotes the use of high-efficiency agricultural byproducts as fuel for electric power and agro-industry process heat;

• China. The Chinese Coalbed Methane Project demonstrates technologies in Chinese coal mines for capturing clean-burning methane as fuel;

• Latvia. The Latvia Solid Waste Management and Landfill Gas Recovery project ($25 million total, with $5 million from GEF) will harness landfill gas for electricity production and facilitate separation of recyclable materials;

• Philippines. The project supports the connection of a grid-connected power plant on Mindanao which combines solar and hydroelectric power;

• Bangladesh. The Rural Electrification and Renewable Energy Development project promotes solar energy in rural areas implemented by established Bangladeshi institutions and is expected to provide solar power to as many as 130,000 additional rural households;

• Ecuador. The Renewable Energy for Electricity Generation, Renewable Electrification of the Galapagos Islands project is aimed at reducing Ecuador's energy-related carbon dioxide emissions by introducing solar and wind energy to the Galapagos Archipelago, and is expected to provide wind and solar re-powering of village mini-grids on three islands serving more than 5,000 people; and

• Kenya. The Ormat Olkaria III Geothermal Power Development project will provide GEF financing for the first private sector financed and managed geothermal electric project in Africa and among the first private power projects in Kenya and East Africa.

• Dedicating Significant Funds to United States Agency for International Development (USAID). The President has maintained a strong commitment to technology transfer and capacity building in developing countries by requesting $155 million dedicated to climate change in the USAID fiscal year 1903 budget.

• Following up on the recently concluded Technology Cooperation Agreement Pilot Project (TCAPP), USAID is working with partners in Brazil, Egypt, Mexico, the Philippines, and Southern Africa to implement projects and activities designed to encourage the accelerated adoption of energy efficiency and renewable energy technologies and practices in several key sectors.

• Brazil. Technology cooperation efforts are focused on the development of new sustainable, energy efficient and renewable energy technologies to meet the development needs in the Northeast region. This effort provided startup financing for rural energy entrepreneurs through a combination of enterprise development services and startup financing.

• Philippines. Technology cooperation efforts are supporting national goals to expand rural electrification by using renewable energy sources such as, wind power.

• Southern Africa. USAID is supporting activities designed to promote the widespread use of solar water heaters in selected areas. Program-wide efforts also include a focus on the development and dissemination of outreach and communication tools in an effort to encourage information sharing.

• The Cairo Air Improvement Project (CAIP) is a $60 million USAID program that is designed to reduce vehicular emissions, such as particulates and lead. The CAIP is reducing air pollution by:

• operating a vehicle emission testing, tune-up, and certification program and promoting the conversion of diesel-fueled, public sector, municipal bus fleets to compressed natural gas; and

• reducing the concentration of air pollution from smelters.

• Building on International Cooperative Agreements:

• Joint Research with Japan. The U.S. and Japan continue their High-Level Consultations on climate change issues. Later this month a team of U.S. experts will meet with their Japanese counterparts to discuss specific projects within the various areas of climate science and technology to identify which of the highest priority opportunities to pursue.

• Joint Research with Italy. The United States and Italy convened a "Joint Climate Change Research Meeting" in Rome on January 22–23, 2002, following upon

a pledge of President Bush and Prime Minister Berlusconi to undertake joint research on climate change. This pledge recognized the need to draw on sound science and the power of technology to reduce the uncertainty associated with future global climate and environmental challenges. The two sides identified more than 20 joint climate change research activities for immediate implementation and more topics for further development in critical areas of global and regional climate modeling, atmospheric studies related to climate, carbon cycle research, low-carbon technologies and other related areas. The climate science research activities for immediate implementation will improve the capability to understand, monitor and predict climatic variations and their impacts. In addition, the technology research activities for immediate implementation will contribute to the development of advanced low carbon technologies to limit net emissions of greenhouse gases.

• Pursue Joint Research with Central America. The United States and Central American Heads of Government signed the Central American-United States of America Joint Accord (CONCAUSA) on December 10, 1994. The original agreement covered cooperation under action plans in four major areas: conservation of biodiversity, sound use of energy, environmental legislation, and sustainable economic development. On June 7, 2001, the United States and its Central American partners signed an expanded and renewed CONCAUSA Declaration, adding disaster relief and climate change as new areas for cooperation. The new CONCAUSA Declaration calls for intensified cooperative efforts to address climate change through scientific research, estimating and monitoring greenhouse gases, investing in forestry conservation, enhancing energy efficiency, and utilizing new environmental technologies.

ENHANCED SCIENCE AND TECHNOLOGY

Summary

The President's policy builds on his June 11 commitments to global climate science and technology: 1) fully fund high-priority areas for climate change science over the next 5 years; and 2) strengthen technology research at universities and national labs, to enhance partnerships in applied research, develop improved technology for measuring and monitoring gross and net greenhouse gas emissions, and fund demonstration projects for cutting-edge technologies, such as bioreactors and fuel cells.

• Increase Support for America's Commitment to Climate Science and Technology Initiatives. The Administrations fiscal year 2003 budget seeks an additional $700 million for climate change programs, bringing total climate spending up to $4.5 billion per year. This commitment to climate change research and development is unmatched in the world, and is particularly notable given America's focus on domestic and international security issues in the fiscal year 1903 budget. A key element of this effort is dedicated to funding for the Climate Change Research Initiative and the National Climate Change Technology Initiative. These initiatives are core components of the President's 1903 budget. They are designed to fund high-priority research to address major gaps in our current understanding of climate science and to promote the development of the most promising "breakthrough" technologies for clean energy generation and carbon sequestration.

• The Climate Change Research Initiative. The U.S. will spend $1.7 billion in fiscal year 2003 for basic research on climate change, $40 million of which is dedicated to leverage other funding to address major gaps in understanding the carbon cycle and the role of black soot.

• The National Climate Change Technology Initiative. The U.S. will spend $1.3 billion on climate change technologies, of which $40 million will be spent on development and deployment of advanced energy and sequestration technologies critical to long-term emission reduction.

• The President Has Established a New High-Level Committee on Climate Change Science and Technology Integration (CCCSTI). This Committee consists of the Secretaries of Commerce, Energy, State, Agriculture, Interior, Health and Human Services, Defense, and Transportation, EPA Administrator, OMB Director, NEC Director, NASA Administrator, NSF Director and CEQ Chairman. The Executive Director of the committee will be the Director of the Office of Science and Technology Policy. The functions of the CCCSTI include but are not limited to: 1) providing recommendations concerning climate science and technology to the President; 2) recommending the movement of funding and programs across agency boundaries; and 3) coordination with the Office of Management and Budget on the Committee's recommendations. The Chair of CCCSTI is responsible for the final review of recommendations to the Climate Change Panel. Research will continue to be coordi-

nated through the Nation Science and Technology Council in accordance with the Global Change Research Act of 1990.

Climate Change Research Initiative

On June 11, 2001, the President announced a new commitment to developing a science-based climate change policy, and a new commitment to funding research on "breakthrough technologies" that will help meet the long-run climate change challenge. To study areas of scientific uncertainty and identify priority areas where investments can make a difference, the President created the Climate Change Research Initiative (CCRI). The CCRI promotes a vision focused on the effective use of scientific knowledge in policy and management decisions, and continued evaluation of management strategies and choices.

The President's fiscal year 1903 budget requested $40 million for CCRI to be shared among five agencies (NOAA, NSF, NASA, DOE, and USDA). This investment will focus on answering key questions recently identified by the National Academy of Sciences in its 2001 report, "Climate Change Science: An Analysis of Some Key Questions." The CCRI will improve the integration of scientific knowledge, including measures of uncertainty, into effective decision support systems and will adopt performance metrics and deliverable products useful to policymakers in a short timeframe (2–5 years).

Specific priorities identified for fiscal year 2003 include:

- Understanding the North American Carbon Cycle. An intensive research effort will be focused on understanding North American terrestrial and oceanic carbon sources and sinks, to improve monitoring techniques, reconcile approaches for quantifying carbon storage, and elucidate key controlling processes and land management practices regulating carbon fluxes between the atmosphere, land, and the ocean. This effort will develop automated carbon dioxide and methane sensors, and improve ground-based measurements and inventories of forest and agricultural lands.
- Developing Reliable Representation of the Global and Regional Climatic Forcing by Atmospheric Aerosols. Aerosols and tropospheric ozone play unique but poorly quantified roles in the atmospheric radiation budget. CCRI investments will implement plans developed by the interagency National Aerosol-Climate Interactions Program to define and evaluate the role of aerosols that absorb solar radiation, such as black carbon and mineral dust. Proposed activities include field campaigns (including aircraft fly overs), in situ monitoring stations, and improved modeling and satellite data algorithm development.
- Investing in Computer Modeling. The continued development and refinement of computer models that can simulate the past and future conditions of the Earth's climate system is important for providing more accurate projections of future climate change. NOAA will establish a Climate Modeling Center within the Geophysical Fluid Dynamics Laboratory (GFDL) at Princeton, New Jersey, to focus on model product generation research, assessment, and policy applications.
- Ensuring High-Quality, Long-Term Climate Data Records. This is a long-term effort to develop high fidelity climate data records from satellite observing systems. Initial work will target calibration and validation of instruments planned for the National Polar-orbiting Operational Environment Satellite System (NPOESS) to ensure a smooth transition and guarantee climate-quality data.

National Climate Change Technology Initiative

On June 11, 2001, the President announced a new commitment to developing a science-based climate change policy, and a new commitment to funding research on "breakthrough technologies" that will help meet the long-run climate change challenge. To advance and bring focus to technologies that offer great promise to significantly reduce greenhouse gas emissions, the President created the National Climate Change Technology Initiative (NCCTI). The President charged the Secretaries of Commerce and Energy, working with other agencies, to:

- Evaluate the State of U.S. Climate Change Technology Research and Development and Make Recommendations for Improvement. The U.S. Government funds many different technologies that can help mitigate greenhouse gas emissions. Some are designed to improve energy efficiency or create opportunities to switch to fuels, products, and processes that emit lower amounts of greenhouse gases. Others enhance carbon removal or storage in terrestrial, ocean, and geological sinks, or explore innovative concepts and breakthrough technologies.
- Provide Guidance on Strengthening Basic Research at Universities and National Laboratories, Including the Development of Advanced Mitigation Technologies that Offer the Greatest Promise for Low-Cost Reductions of Greenhouse Gas Emissions. There are many scientific and technological challenges regarding costs, envi-

ronmental impacts, and public acceptability that must be resolved before climate change mitigation technologies can reach their full potential. Federal research efforts can help meet these challenges.

- Develop Opportunities to Enhance Private-Public Partnerships in Applied Research and Development to Expedite Innovative and Cost-Effective Approaches to Reducing Greenhouse Gas Emissions. The U.S. Government has established partnerships with the private sector to advance technologies that mitigate greenhouse gas emissions. It is critical to enhance this role and ensure that partnerships with industry are directed toward the most mutually beneficial outcomes.
- Make Recommendations for Funding Demonstration Projects for Cutting-Edge Technologies. Cutting-edge technologies hold the promise of significantly reducing greenhouse gas emissions.
- Evaluate Improved Technologies for Measuring and Monitoring Gross and Net Terrestrial Greenhouse Gas Emissions. Private sector investors are reluctant to participate in projects without reliable and credible quantification of the uncertainties associated with different land management practices. Cost-effective measurement systems will not only increase the attractiveness of agricultural greenhouse gas projects to investors, but can also provide valuable information to individual farmers and ranchers optimizing the use of fuel, fertilizers, and other substances.

The President's fiscal year 1903 Budget requests $40 million within the Department of Energy to begin work on NCCTI. Specific research areas are being identified through an interagency review process. The NCCTI will build on an existing base of research and development in climate change technologies, primarily at the Department of Energy, the Environmental Protection Agency, and the Department of Agriculture. A complete report on the findings and recommendations of the NCCTI will be issued soon.

ADDENDUM TO THE GLOBAL CLIMATE CHANGE POLICY BOOK

The Global Climate Change Policy Book distributed with the President's February 14th speech on Clear Skies and Global Climate Change included several calculated statistics:

- 2002 emission intensity: 183 metric tons of carbon equivalent emissions per million dollars GDP
- 2012 emissions intensity: 158 metric tons of carbon equivalent emissions per million dollars GDP
- 2002–2012 decline in emission intensity based on current forecasts with existing policies and efforts: 14 percent
- Expected emission reductions in 2012 resulting from the President's commitment to reduce intensity by 18 percent: more than 100 million metric tons carbon equivalent

This document and accompanying spreadsheet describes the data used to produce these numbers.

Three primary forecasts underlie these intensity and emission reduction estimates: real GDP, energy-related carbon dioxide emissions, and other carbon dioxide and greenhouse gas emissions. The sources of these forecasts are described below, followed by an explanation of the calculated intensities and emission reductions.

Real GDP forecasts (spreadsheet row 28) are based on the Annual Energy Outlook 2002, published by the Energy Information Administration in December 2001. In turn, these are based on the DRI-WEFA July 2001 Trend Growth scenario. Although these forecasts were made before September 11 and before the exact nature of last year's recession was clear, the forecast growth of 38 percent over 2002–2012 matches the recent forecasts published in the 2003 Budget of the U.S. Government. Real GDP forecasts are converted from 1996 dollars to 2001 dollars (spreadsheet row 29) using the implicit GDP deflator, published in the National Income and Product Accounts.

Forecasts of energy-related carbon dioxide emissions (spreadsheet row 25) are also based on the Annual Energy Outlook 2002. These emissions are derived from the use of fossil fuels forecast by the National Energy Modeling System developed by the Energy Information Administration, incorporating the economic growth assumptions described above.

Forecasts of other carbon dioxide and greenhouse gas emissions (spreadsheet row 26) are based on two sources. The projections begin with 1999 inventories reported in Emissions of Greenhouse Gases in the United States 1999, published by the Energy Information Administration. Future emission levels are estimated using growth rates derived from reports published by the Environmental Protection Agency: Addendum to the U.S. Methane Emissions 1990–2020: Inventories, Projections and Op-

portunities for Reductions, Climate Action Report 2001, U.S. High GWP Gas Emissions 1990–2010: Inventories, Projections, and Opportunities for Reductions.

There are two alternative forecasts provided on the accompanying spreadsheet. The first (spreadsheet row 39) is based on similar growth rates, but using inventories published in Draft Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2000. The second (spreadsheet row 44) is based on inventories and projections in the Climate Action Report 2001 and uses growth rates estimated to include existing policies and measures to reduce greenhouse gases.

Greenhouse gas intensity is computed as the ratio of total greenhouse gas emissions (spreadsheet rows 27, 40 and 45) to real GDP (spreadsheet row 29). This is multiplied by 1000 to convert to units of metric tons carbon equivalent (mtce) per million dollars of GDP.

The intensity decline is measured as one minus the ratio of 2012 greenhouse gas intensity to 2002 greenhouse gas intensity. For example, in the reference case intensity declines from 183 to 158 mtce/$million. 14 percent = 1—158/183.

Emission reductions from business as usual are computed by first determining the emissions implied by the President's goal. Specifically, forecast GDP in 2012, multiplied by (1—18 percent), multiplied by intensity in 2002, and divided by 1000 (the latter converts from thousands to millions of tons). In the reference case, this works out to 14,459 x 0.82 x 183.3 / 1000 = 2173 million metric tons of carbon. This is then subtracted from forecast emissions in 2012, 2279, to yield the reported estimate of 106 million tons of reductions.

Note that the exact intensity goal in 2012 will not be known until accurate inventory data for 2002 is available as a basis for the 18 percent decline. The exact emission goal will then depend on the eventual GDP level in 2012.

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U.S. High GWP Gas Emissions 1990–2010: Inventories, Projections, and Opportunities for Reductions. http://www.epa.gov/ghginfo/reports/index.htm
Table A20.
Assumptions to the Annual Energy Outlook 2002, page 13.
Table S–14.
Table A19.
Table 1.
Table 5–2.
Exhibit 1.4

[July 9, 2002]

REPORT TO CONGRESS ON FEDERAL CLIMATE CHANGE EXPENDITURES

"The challenge is to act in a serious and sensible way, given the limits of our knowledge."

President GEORGE W. BUSH, *June 11, 2001.*

Introduction

The following is a detailed account of Federal spending and performance goals for climate change programs and activities, both domestic and international, as included in the President's fiscal year 2003 Budget. This report is being provided in response to Section 559(b) of Public Law 107–115, Foreign Operations, Export Financing, and Related Programs Appropriations Act, 2002.

On February 14, 2002, President Bush announced a new national goal to reduce the "greenhouse gas intensity" of the American economy by 18 percent during the next decade. Achieving this goal will require an enhanced and sustained national effort to develop and deploy advanced energy and sequestration technologies, while maintaining a strong American economy. As reflected in the United Nations Framework Convention on Climate Change (UNFCCC), to which the United States is a

party, global climate change represents a serious, long-term challenge for all of the nations of the world. The Administration has proposed a comprehensive plan for achieving meaningful progress in tackling this challenge. Progress will be achieved by relying on a range of significant investments in reducing the fundamental scientific uncertainties associated with anthropogenic climate change, advancing the development and introduction of energy-efficient and renewable technologies, and incentivizing emissions reductions throughout our economy. The budget information presented in this Report reflects the Administration's intensified focus and prioritization of meeting our international commitments under the UNFCCC and responsibility to the American people for preserving a strong American economy.

The President's fiscal year 2003 Budget proposes $4,475 million. This figure is $653 million, or 17 percent, higher than fiscal year 2002 enacted for spending programs and tax policies related to or associated with climate change. The Budget request for climate change programs is the highest level ever, though some programs were reduced to eliminate unrequested earmarks or certain projects approaching commercialization that are more properly now funded by the private sector. Other higher priority programs were increased. At this level, the United States leads the world in climate change research, and has invested nearly $20 billion in such research over the past decade. However, in its June 2001 Report, Climate Change Science: An Analysis of Some Key Questions, the National Research Council concluded that major challenges still remain to meaningfully improve our current understanding of the science of global climate change:

"Making progress in reducing the large uncertainties in projections of future climate will require addressing a number of fundamental scientific questions relating to the buildup of greenhouse gases in the atmosphere and the behavior of the climate system. Issues that need to be addressed include: a) the future usage of fossil fuels; b) the future emissions of methane; c) the fraction of the future fossil-fuel carbon that will remain in the atmosphere and provide radiative forcing versus exchange with the oceans or net exchange with the land biosphere; d) the feedbacks in the climate system that determine both the magnitude of the change and the rate of energy uptake by the oceans, which together determine the magnitude of and time history of the temperature increases for a given radiative forcing; e) details of the regional and local climate change consequent to an overall level of global climate change; f) the nature and the causes of the natural variability of climate and its interactions with forced changes; and g) the direct and indirect effects of the changing distributions of aerosols. Maintaining a vigorous, ongoing program of basic research, funded and managed independently of the climate assessment activity, will be crucial for narrowing those uncertainties."

"Because there is considerable uncertainty in our current understanding of how the climate system varies naturally and reacts to emissions of greenhouse gases and aerosols, current estimates of the magnitude of future warming should be regarded as tentative and subject to future adjustments (either upward or downward)."

And recently, the U.S. Climate Action Report 2002 to the United Nations stressed:

"One of the weakest links in our knowledge is the connection between global and regional predictions of climate change. The National Research Council's response to the President's request for a review of climate change policy specifically noted that fundamental scientific questions remain regarding the specifics of regional and local projections (NRC 2001). Predicting the potential impacts of climate change is compounded by a lack of understanding of the sensitivity of many environmental systems and resources B both managed and unmanaged B to climate change."

The Report notes the "considerable uncertainty" about the science of global climate change, including the uncertainty regarding natural climate variability and the role of aerosols, and "recognize[s] that definitive prediction of potential outcomes is not yet feasible." The Report does not identify new risks, but rather provides a complete review of the numerous, often conflicting "what if" scenarios of potential impacts of climate change, both dire and beneficial. This Report makes clear that models, such as those used by the prior Administration's 2000 National Assessment, cannot yet be relied upon to make Aaccurate predictions of the specific changes in climate that will occur over the next hundred years."

The Administration's fiscal year 2003 budget request to Congress includes the initial response to President Bush's direction last June for a Climate Change Research Initiative ("CCRI") to address many of these major gaps in our current understanding of global climate change. Specific CCRI priorities will focus on improving our understanding of the North American carbon cycle and the role of aerosols and tropospheric ozone in climate change, enhancing computer modeling of climate and developing high quality, long term climate observation data. The Administration will continue to determine where financial resources in the climate change portfolio

can be redirected from lower priority work to higher priority projects that address specific areas of research identified by the National Research Council.

Additionally although not included in this Report, the recently enacted Farm Bill will significantly expand conservation programs on farm and forest lands, accompanied by expanded carbon sequestration services. See Addendum B.

In addition to describing our investments in global climate science, the programs and tax policies in this report represent one way to inventory a set of programs and tax policies associated with energy use, carbon sequestration and climate change. Funding generally falls into four major program areas.

U.S. Global Change Research Program. The United States Global Change Research Program (USGCRP) seeks to provide a sound scientific understanding of both the human and natural forces that influence the Earth's climate system. The information produced by USGCRP's scientists is used by national and international policymakers to inform decisions on global change issues. The fiscal year 2003 Budget proposes $1,714 million for the USGCRP, an increase of $44 million over fiscal year 2002 enacted. See Table 2 for detailed information about the USGCRP.

In addition to the USGCRP, the fiscal year 2003 Budget requests $40 million for the new Climate Change Research Initiative (CCRI), which was created by the President to advance and bring focus to and leverage climate change research spending. The CCRI complements the existing USGCRP. CCRI funding will be shared among five agencies (NOAA, NASA, NSF, USDA, DOE), and the program will adopt performance metrics and deliverable products useful to policymakers in a short timeframe (2 to 5 years). It will enhance observation and monitoring systems and improve the integration of scientific knowledge, including measures of uncertainty, into effective decision support systems. See Table 3 for information about the CCRI.

Technology Research, Development and Deployment. The programs in this category have the effect of stimulating the development and use of renewable energy technologies and energy efficient products that can help improve energy efficiency and reduce greenhouse gas emissions. The fiscal year 2003 Budget proposes $1,757 million in discretionary spending and tax incentives, an increase of $539 million over fiscal year 2002 enacted. In addition to programs administered by the Department of Energy (DOE), this category also includes programs within the Environmental Protection Agency (EPA) and the Department of Agriculture (USDA). See Tables 4–5 for detailed information about the programs and tax proposals in this category.

In June, 2001, the President committed the United States to work within the United Nation's framework to develop an effective and science-based response to the issue of global climate change. He noted that the United States is a leader in innovation and technology and that technology offers great promise to address this issue. As part of this commitment, he created a National Climate Change Technology Initiative. The National Climate Change Technology Initiative integrates a number of interdependent facets of the technological component of this approach to the global climate change issue: applied research and development; supporting basic research carried out by universities and national laboratories; partnering with industry and others, including international partners, in order to move technologies into the marketplace; promoting cutting-edge technologies through demonstration projects; and measuring and monitoring greenhouse gas emissions, inventories and flows. This Initiative will provide a framework for guiding the technology component of climate change related Federal R&D.

International Assistance. International assistance programs support developing country efforts to address climate change through improvements in energy efficiency, renewable energy, land use changes and forestry practices. The fiscal year 2003 Budget proposes $211 million, an increase of $32 million over fiscal year 2002 enacted, for climate change programs administered by the U.S. Agency for International Development and to support the Secretariat of the Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change. See Table 6 for information on international assistance programs related to climate change, and Appendix A for obligations and expenditures by country and activity for the Agency for International Development as requested in Section 559 (b)(2) of Public Law 107–115.

Other Climate-Related Programs. There are several programs that have multiple environmental benefits including their contribution to improving energy efficiency and reducing greenhouse gas emissions. The programs identified in this category include: DOE's Weatherization and State Energy Grants; DOE programs that promote cleaner coal and natural gas combustion, and nuclear energy R&D; and; U.S. contributions to the Global Environment Facility (GEF). GEF funding helps address trans-border environmental problems like international water pollution, biological

diversity conservation, and climate change. The GEF's climate change projects are related to the U.N. Framework Convention on Climate Change, not the Kyoto Protocol. The fiscal year 2003 Budget proposes $807 million, an increase of $20 million over fiscal year 2002 enacted, for the programs in this category. See Table 7 for more details on these programs.

SUMMARY OF FEDERAL CLIMATE CHANGE EXPENDITURES

Table 1. Programs and Tax Policies Related to Climate Change—FY 2003 Budget

(Budget authority and tax incentives; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Directly Related Programs & Policies:.				
U.S. Global Change Research Program	1,728	1,670	1,714	+44
Climate Change Research Initiative	—	—	40	+40
Technology Research, Development and Deployment:.				
Spending Programs	1,176	1,218	1,202	-16
Tax Incentives [1]	—	—	555	+555
National Climate Change Technology Initiative[2]	—	—	—	—
International Assistance	177	179	211	+32
Other Climate-Related Programs:.				
DOE—Weatherization & State Energy Grants	191	275	316	+41
DOE—Fossil Energy R&D (cleaner coal & natural gas)	274	442	398	-44
DOE—Nuclear Energy R&D (NERI)	34	32	25	-7
Treasury B Global Environment Facility [3]	41	38	68	+30
TOTAL [4]	3,603	3,822	4,475	+653

[1]The cost of the five energy tax incentives related to climate change included in the President's fiscal year 2003 Budget is $4.6 billion over 5 years; $7.1 billion over 10 years.

[2] The National Climate Change Technology (NCCTI) will build on an existing base of research and development in climate change technology, primarily at DOE, EPA, and USDA. The President's fiscal year 2003 Budget requests $40 million for NCCTI within the DOE budget. Specific research areas are being identified through an interagency review process.

[3] The total fiscal year 2003 request for the Global Environment Facility (GEF) is $177.8 million. Approximately 38 percent of total GEF funding from all sources supports climate-related projects (e.g. expanding clean energy production and efficient energy use). The GEF, which also provides funding for other global environmental concerns, does not allocate funds by project type.

[4] Total may not add due to rounding. Total adjusted to eliminate double counts.

U.S. GLOBAL CHANGE RESEARCH PROGRAM

Table 2. By Agency/Appropriation Account—FY 2003 Budget

(Discretionary budget authority; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Department of Health and Human Service:.				
National Institutes of Health	54	60	68	+8
National Aeronautics and Space Administration:.				
Science, Aeronautics, and Technology	1,176	1,090	1,109	+19
Department of Energy:.				
Science (Biological & Environmental Research)	116	120	126	+6
National Science Foundation:.				
Research and Related Activities	181	188	188	0
Department of Agriculture:.				
Agricultural Research Service	29	30	30	0
Cooperative State Research, Education and Extension Services	4	9	17	+8
Research and Education	4	9	17	+8
Economic Research Service	1	1	1	0
Forest Service.				
Forest and Rangeland Research	17	17	17	0
Subtotal—USDA	51	57	65	+8

Table 2. By Agency/Appropriation Account—FY 2003 Budget—Continued

(Discretionary budget authority; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Department of Commerce:.				
National Oceanic and Atmospheric Administration Operations, Research, and Facilities	93	100	100	0
Department of the Interior:.				
U.S. Geological Survey Surveys, Investigations, and Research	27	28	28	-2
Environmental Protection Agency:.				
Science and Technology	23	21	22	+
Smithsonian Institution:.				
Salaries and Expenses	7	7	7	0
TOTAL[1]	1,728	1,670	1,714	+44

[1] Total may not add due to rounding.

CLIMATE CHANGE RESEARCH INITIATIVE

Table 3. By Agency/Appropriation Account—FY 2003 Budget

(Discretionary budget authority; dollars in millions)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Department of Commerce:.				
National Oceanic and Atmospheric Administration Operations, Research, and Facilities	—	—	18	+18
National Science Foundation:.				
Research and Related Activities	—	—	15	+15
National Aeronautics and Space Administration:.				
Science, Aeronautics, and Technology	—	—	3	+3
Department of Energy:.				
Science (Biological & Environmental Research)	—	—	3	+3
Department of Agriculture:.				
Forest Service/Natural Resources Conservation Service[1]	—	—	1	+1
TOTAL	—	—	40	+40

[1] Based on $500,000 for the Forest Service and $500,000 for the Natural Resources Conservation Service.

U.S. Global Change Research Program. Much of the U.S. investment in research on climate and other global environmental changes is coordinated through the U.S. Global Change Research program (USGCRP). The USGCRP has existed for more than a decade, and provides funding at nine different agencies for fundamental research on natural and human-induced changes in the global environment, with the goal of attaining a more complete understanding of global climate change to better respond to the challenges it presents. The fiscal year 2003 Budget proposes $1,714 million for the USGCRP, an increase of $44 million over the fiscal year 2002 enacted level.

Climate Change Research Initiative. In addition to the USGCRP, the fiscal year 2003 Budget requests $40 million for the new Climate Change Research Initiative (CCRI), which was created by the President to advance and bring focus to climate change research. The CCRI complements the existing USGCRP. CCRI funding in fiscal year 2003 will be shared among five agencies (NOAA, NASA, NSF, USDA, DOE), and the program will adopt performance metrics and deliverable products useful to policymakers in a short timeframe (2 to 5 years). It will enhance observation and monitoring systems as well as improve the integration of scientific

knowledge, including measures of uncertainty, into effective decision support systems. CCRI funding in 2003 will focus on two main areas: reducing the uncertainties in climate science, and supporting policy and management decisions. In the first category, specific priorities include understanding the North American carbon cycle, developing reliable representation of global and regional climatic forcing by atmos-

pheric aerosols, and investing in computer modeling. In the second category, specific priorities include developing tools for risk management under uncertainty and ensuring high-quality, long-term climate data records.

ENERGY POLICY PROPOSALS

Table 4. Tax Incentives—FY 2003 Budget

(Revenue effect in millions of dollars)

	2003	2004	2005	2006	2007	Total 2003–07
Homes.						
Provide tax credit for residential solar energy systems	-6	-7	-8	-17	-24	-62
Renewable Energy.						
Extend the tax credit for electricity produced from wind and biomass for 3 years; expand eligible biomass sources to include certain biomass produced from forest-related resources, agricultural sources, and other specified sources	-227	-303	-212	-143	-146	-1031
Transportation.						
Provide tax credit for purchase of certain hybrid and fuel cell vehicles	-80	-181	-349	-530	-763	-1903
Industry.						
Provide tax credit for energy produced from landfill gas	-34	-59	-86	-120	-140	-439
Provide tax credit for combined heat and power property	-208	-235	-238	-296	-139	-1116
TOTAL[1]	-555	-785	-893	-1106	-1212	-4551

[1] Total may not add due to rounding.

Energy Policy Proposals B Tax Incentives. The President is proposing $4,551 million in clean energy tax credits over 5 years ($7.1 billion over 10 years) for investments in renewable energy (solar, wind, and biomass), hybrid and fuel cell vehicles, co-generation, and landfill gas conversion. (see Table 2). These incentives are important to meeting the nation's long-term energy supply and security needs, reducing pollution, and projected greenhouse gas emissions. The following is an explanation of the clean energy tax incentives proposed in the fiscal year 2003 Budget.

Homes

• Tax credit for residential solar energy systems. Current law provides a 10-percent investment tax credit to businesses for qualifying equipment that uses solar energy to generate electricity; to heat, cool or provide hot water for use in a structure; or to provide solar process heat. No credit is available for nonbusiness purchases of solar energy equipment. The Administration proposes a new tax credit for individuals who purchase photovoltaic equipment and solar water heating systems for use in a dwelling unit that the individual uses as a residence. Equipment would qualify for the credit only if used exclusively for purposes other than heating swimming pools. An individual would be allowed a cumulative maximum credit of $2,000 per residence for photovoltaic equipment and $2,000 per residence for solar water heating systems. The credit for solar water heating equipment would apply only if placed in service after December 31, 2001 and before January 1, 2006, and to photovoltaic systems placed in service after December 31, 2001 and before January 1, 2008.

Renewable Energy

• Tax credit for electricity produced from wind or biomass. Current law provides taxpayers a 1.5 cent-per-kilowatt hour tax credit (adjusted for inflation after 1992) for electricity produced from wind, "closed-loop" biomass, and poultry waste. Biomass refers to trees, crops and agricultural wastes used to produce power, fuels or chemicals. The electricity must be sold to an unrelated third party and the credit applies to the first 10 years of production. The current tax credit covers facilities placed in service before January 1, 2002, after which it expires. The new proposal would:

• Extend current biomass credit. This proposal would extend for 3 years the 1.5 cent-per-kilowatt hour biomass credit for facilities placed in service before January 1, 2005.

• Expand definition of eligible biomass. This proposal expands the definition of eligible biomass to include certain forest-related resources and agricultural and other sources for facilities placed in service before January 1, 2002. Electricity produced at such facilities from newly eligible sources would be eligible for the credit only from January 1, 2002, through December 31, 2004. The credit for such electricity would be computed at a rate equal to 60 percent of the generally applicable rate. Electricity produced from newly eligible biomass co-fired in coal plants would be eligible for the credit only from January 1, 2002, through December 31, 2004.

Transportation

• Tax credit for hybrid and fuel cell vehicles. Currently, a 10 percent tax credit up to $4,000 is provided for the cost of a qualified electric vehicle. A qualified electric vehicle is a motor vehicle that is powered primarily by an electric motor drawing current from rechargeable batteries, fuel cells, or other portable sources of electric current. Electric and hybrid vehicles have the potential to increase energy efficiency as well as reduce air pollution and greenhouse gas emissions. To encourage the purchase of such vehicles the Administration is proposing the following tax credits:

• A credit of up to $4,000 for qualified hybrid vehicles purchased after December 31, 2001 and before January 1, 2008. The amount of the credit would depend on the percentage of maximum available power provided by the rechargeable energy storage system and the amount by which the vehicle's fuel economy exceeds the 2000 model year city fuel economy.

• A credit of up to $8,000 for new qualified fuel cell vehicles purchased after December 31, 2001 and before January 1, 2008. A minimum credit of $4,000 would be provided, which would increase as the vehicle's fuel efficiency exceeded the 2000 model year city fuel economy, reaching a maximum credit of $8,000 if the vehicle achieved at least 300 percent of the 2000 model year city fuel economy.

Industry

• Tax credit for energy produced from landfill gas. Taxpayers that produce gas from biomass are eligible for a credit equal to $3 per barrel-of-oil equivalent. To qualify, the gas must be produced domestically from a facility placed in service before July 1, 1998 and sold to an unrelated person before January 1, 2008. The new proposal would extend the credit to fuel produced from landfill methane produced from a facility in service after December 31, 2001 and before January 1, 2011. The credit for fuel produced at landfills subject to EPA's 1996 New Source Performance Standards/Emissions Guidelines would be limited to two-thirds of the otherwise applicable amount if any portion of the facility for producing fuel at the landfill was placed in service before July 1, 1998, and beginning on January 1, 2002, in all other cases.

• Tax credit for combined heat and power property. Combined heat and power (CHP), also known as co-generation, is a highly efficient form of electric generation that recycles heat which is normally lost under traditional power combustion methods. CHP captures the heat left over from industrial use, providing a source of residential and industrial heating and air conditioning in the local area around the power plant. CHP systems achieve a greater level of overall energy efficiency, thereby reducing energy consumption, costs, and carbon emissions. No income tax credit is available for investment in CHP property. The Administration is proposing a new 10 percent investment credit for qualified CHP systems placed in service after December 31, 2001 and before January 1, 2007.

Table 5. Program Details by Agency/Account—FY 2003 Budget

(Discretionary budget authority; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Department of Energy (DOE).				
Energy Supply	375	393	408	+15
Renewable Energy Resources R&D	(370)	(386)	(408)	(+22)
Nuclear Energy	(5)	(7)	(0)	(-7)
Energy Conservation R&D	619	640	588	-52
Fossil Energy R&D (sequestration R&D)	18	32	588	-52
Science	35	35	35	0
Energy Information Administration	3	3	3	0
Subtotal—DOE	1,050	1,103	1,088	-15
Environmental Protection Agency (EPA).				
Environmental Programs & Management	96	89	91	+2
Science and Technology	27	26	17	-9
Subtotal—EPA	123	115	108	-7
Department of Agriculture (USDA).				
Forest Service	3	0	1	+1
Forest and Rangeland Research Agricultural Research Service	0	0	5	+5
Subtotal—USDA	3	0	6	+6
TOTAL [1]	1,176	1,218	1,202	-16

[1]Total may not add due to rounding.

Technology Research, Development and Deployment. The fiscal year 2003 Budget proposes $1,202 million in discretionary funding, a decrease of $16 million from fiscal year 2002 enacted, for research, development, and deployment of renewable energy technologies and energy efficient products that help reduce the use of fossil fuels and U.S. greenhouse gas emissions. Better methods to measure and monitor carbon dioxide in soils and from forests are also funded. Table 5 provides a detailed accounting by agency of the technology programs in this report related to energy efficiency, conservation, renewable energy, and carbon sequestration. The reduction in funding reflects a decrease in conservation R&D for technologies that can be picked up by the private sector and a shift of conservation funds to weatherization grants. The following sections highlight selected agency programs.

1. Buildings

The buildings sector is responsible for about 33 percent of U.S. greenhouse gas emissions.

Most of the emissions result from the electricity needed to run appliances and equipment in buildings, such as heating, ventilation, and air conditioning (HVAC) equipment. The budget includes programs within DOE and EPA designed to develop highly efficient new appliances and HVAC systems, and to more rapidly deploy energy efficient products for buildings and homes throughout the marketplace. The following is a summary of the major activities by agency in the buildings sector:

- DOE Building Technology Program. The budget includes $93 million for DOE's building technology and related activities, a decrease of $12 million from fiscal year 2002 enacted. DOE has been working with industry to define technology "roadmaps" toward more efficient buildings, and is using that process to guide its R&D programs.

One major component is the Building America program, which creates partnerships with traditional housing developers and manufacturers of industrialized housing to demonstrate how new technologies can be integrated into homes cost-effectively and to disseminate that knowledge to other builders. DOE works with States to encourage them to voluntarily upgrade their commercial and residential building energy codes to require greater energy efficiency in all new construction. DOE's Rebuild America program is the centerpiece of a newly consolidated Community Energy Program—community partners in Rebuild America have committed to improving the energy efficiency of building space.

DOE also funds significant research on more efficient building equipment and appliances, such as advanced lighting, heat pumps, chillers, and commercial refrigeration. DOE develops and promulgates energy efficiency standards for many categories of appliances and also develops testing methodologies used to set standards and to provide efficiency rating labels. (DOE's rating and labeling programs are performed in partnership with the Federal Trade Commission.) Standards and test procedure development will continue for a variety of appliances and will continue to support the joint EPA-DOE Energy Star program.

• EPA Buildings Programs. The budget proposes $50 million, an increase of $1 million over fiscal year 2002 enacted, for EPA's ENERGY STAR partnerships (including ENERGY STAR Labeling and the ENERGY STAR Buildings Program). EPA will work toward the goal of offsetting about 24 percent of the growth in greenhouse gas emissions above 1990 levels expected by 2010 in this sector.

EPA will actively promote its new buildings benchmark tool and work with building owners and mangers to benchmark a total of 29,000 buildings nationwide. EPA will expand its public sector work to increase the number of partnerships with schools and universities and State and local governments to over 1,200. EPA will also continue to actively recruit new small businesses and organizations into ENERGY STAR with the goal of reaching over 7,000 participants in 2003. EPA will continue to play a key role in advancing the efficiency of the Federal Government by enhancing the ability of agencies to procure energy efficient products as well as assist agencies in benchmarking and labeling their high-performing buildings.

2. Transportation

Cars, trucks, aircraft, and other parts of the Nation's transportation system emit about one third of the total anthropogenic U.S. greenhouse gases. A range of new technologies should make it possible for Americans to continue to enjoy the best personal transportation in the world while significantly reducing greenhouse gas emissions. Furthermore, many communities are developing innovative ways to reduce congestion and transportation energy needs by improving highway designs and urban planning, and by encouraging mass transit.

• DOE Transportation Technology Programs. The budget proposes $223 million, a decrease of $30 million from fiscal year 2002 enacted (excludes $53 million in biofuels R&D funded in Renewable Energy Resources and included in the electricity sector below). DOE's Office of Transportation Technologies (OTT) funds research, development, and deployment of technologies that can significantly alter current trends in oil consumption. Commercialization of innovative vehicle technologies and alternative fuels presents an opportunity for reducing reliance on oil. These advanced technologies could also result in dramatic reductions in criteria pollutants and greenhouse gas emissions from the transportation sector. DOE funds research and development for advanced power-train technology (direct-injection) engines, hybrid-electric drive systems, advanced batteries, fuel cells, and light weight materials and for alternative fuels (including ethanol from biomass, natural gas, methanol, electricity, and biodiesel). About half of OTT's R&D funding supports FreedomCAR, a new partnership with the auto industry that builds on the technical successes of its predecessor (Partnership for a New Generation of Vehicles or PNGV), and improves on management and focus.

DOE also funds research to improve the engine efficiency of heavy-duty truck engines while reducing oxides of nitrogen emissions to near-zero levels. This research includes both fuel injection/combustion research and exhaust after-treatment for particulates and nitrogen oxide. This research will be complemented by R&D to reduce parasitic loses from aerodynamic drag and rolling resistance (including computer aerodynamic modeling of new truck body designs); and to make greater use of lower-weight, high-strength materials for all classes of trucks.

• EPA Transportation Programs. The budget proposes $22 million, a decrease of $9 million from fiscal year 2002 enacted, for EPA's clean automotive technology initiative and activities that promote partnerships with State and local governments and transportation authorities to reduce greenhouse gas emissions and air pollution. The reduction in EPA funding reflects a shift in emphasis from PNGV to the new Freedom CAR program managed by DOE. The funding requested will enable EPA to continue its work under Cooperative Research and Development Agreements (CRADAs) with the automotive industry covering both SUVs and urban delivery vehicles. The successful technology development patented by EPA, the hydraulic hybrid vehicle technology, will help to lay the foundation for cost-effective commercialization of high fuel economy, low emission vehicles for delivery to market between 2005 and 2010.

Funding will also continue EPA's work with companies and State and local governments on transportation improvements that reduce vehicle emissions and conges-

tion. Additionally, EPA will develop projects to reduce diesel idling time at truck stops and along highways. EPA will partner with States and manufacturers of idling control devices to help install idle control technologies on trucks and at truck stops that could save one gallon of diesel fuel for each hour a vehicle idles.

3. Industry

Programs in the industry sector support Federal research efforts to develop innovative technologies and production methods which can help businesses achieve productivity gains and prosper in a competitive marketplace while leading to major reductions in emissions of greenhouse gases. Many technologies can help reduce emissions.

• DOE Industry Technology Program. The budget proposes $138 million, a decrease of $11 million from fiscal year 2002 enacted, for DOE's industrial research and related programs. Key DOE industry programs include:

• Industries of the Future. This DOE program works cooperatively with the nation's most energy-intensive industries—such as aluminum, glass, chemicals, forest products, mining, and steel—on developing technologies that increase energy and resource efficiency. Promising collaborative efforts include improvements in the process of making steel, pulp and paper, and other energy-intensive products that could dramatically increase efficiency, lower greenhouse gas emissions, and improve competitiveness.

The Industries of the Future/Crosscutting program supports work that has benefits across many industry sectors. The Integrated Materials program supports development of a range of other advanced materials with special properties, such as intermetallic compounds, metal-matrix composites, and inorganic membranes. Assistance to innovative industries will continue with expanded NICE3 and Inventions and Innovations programs that support the development of energy-efficiency and pollution/waste control technologies. The Industrial Assessment Centers will continue to perform energy and waste-management audits at small and medium sized businesses. The Best Practices programs provide technical expertise and information products to businesses of all sizes on how to use motors, compressed air and steam in an integrated system context. The program also provides plant-wide energy assessments, documented energy savings case studies, and helps to accelerate the adoption by industry of the best available and emerging technologies and best practices.

• EPA Industry Programs. The budget proposes $26 million, an increase of less than $1 million over fiscal year 2002 enacted, for EPA's programs in the industrial sector focusing on reducing carbon dioxide emissions and continuing the successful initiatives to reduce methane emissions and emissions of the high global-warming potential gases. EPA's goals for these efforts are to: 1) greatly enhance the rate of energy and resource efficiency improvements in industry between now and 2010 (working with DOE); 2) cost-effectively return emissions of methane to 1990 levels or below by 2010; 3) cost-effectively limit emissions of the more potent greenhouse gases (HFCs, PFCs, SF6); and 4) facilitate the use of clean energy technologies and purchases of renewable energy.

• Stewardship Programs for the Reduction of Potent Greenhouse Gases. EPA will continue its programs to reduce the more potent greenhouse gases, including methane, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6). EPA will expand partnerships with the magnesium industry and with the electric power industry to reduce emissions of SF6 and will work with the semiconductor, aluminum, and chemical industries to reduce HFC and PFC emissions.

• Methane Programs. EPA will continue its programs to reduce emissions of methane, a gas with more than 20 times the heat trapping capability as carbon dioxide. EPA will work with the natural gas industry, the coal mining industry, the waste management industry, and the agricultural industry to promote cost-effective reductions of methane emissions resulting in a return of methane emissions to 1990 levels or below by 2010. This program has significant potential to achieve cost-effective and meaningful greenhouse gas emission reductions in the American economy.

• ENERGY STAR for Industry. EPA's ENERGY STAR for Industry (formerly Climate Wise) program will continue to work with individual partnership companies. EPA will enhance and expand the ENERGY STAR program for industry by developing energy and related productivity benchmarks of industrial plant performance for five U.S. industries.

• Combined Heat and Power. EPA's Combined Heat and Power (CHP) program is currently funded at about $1 million per year and will continue to promote efficient systems that generate heat and electricity simultaneously at greatly improved conversion efficiencies over single purpose units. This program, unveiled in the fall

of 2001 with 18 partners, currently has more than 50 partners and is expected to grow to 100 partners by the end of 2003. This program is expected to facilitate about 20 CHP projects in 2001 across the industrial and commercial sector yielding about 450 MW of power and to facilitate an additional 35 projects in 2003 yielding about 850 MW. This effort could double the capacity of U.S. combined heat and power systems employed by commercial, industrial, and institutional buildings, and in communities throughout the Nation. EPA will work to identify and eliminate the regulatory and institutional barriers that are currently preventing more rapid dissemination of this important technology.

4. Electricity

The generation of electricity in the U.S. is responsible for more than a third of U.S. greenhouse gas emissions. The budget funds programs in renewable energy technologies. The key DOE programs in this sector are:

- DOE Renewable Energy Resources Programs. The budget proposes $408 million, an increase of $22 million over fiscal year 2002 enacted, for DOE's renewable programs. These include varieties of solar energy (generating electricity either through concentrated heat or photovoltaics), biomass power, wind energy, geothermal power, hydropower, and hydrogen production and storage.
- Solar Energy. Over the past 20 years, Federal R&D has resulted in a 80 percent cost reduction in solar photovoltaics. DOE will maintain R&D of the next generation photovoltaic cells; manufacturing R&D; research in buildings-integrated applications; and fund efforts to develop new, unconventional technologies.
- Biopower. Biomass represents a tremendous renewable resource whose use can help strengthen our energy security, protect the environment, and enhance our rural economy. DOE is testing and demonstrating biomass co-firing with coal; developing advanced technologies for biomass gasification; developing and demonstrating small modular systems; and conducting R&D to help develop "biorefineries" of the future.
- Wind. Use of wind energy is growing very fast. Technologies under development by DOE and its partners can enable a twentyfold or more expansion of usable wind resources, and make wind energy economically viable without the need for Federal incentives. Wind R&D will now focus on advancing the technology so it can be used in low wind speed areas, greatly enhancing the potential use of this renewable energy source.
- Geothermal. Geothermal represents a huge renewable resource which could provide 25,000–50,000 megawatts of generating capacity from currently identified hydrothermal resources if technology existed to develop these resources at a reasonable cost. DOE's R&D program focuses on exploration and drilling to enable industry to locate and characterize new geothermal fields at reduced risk, and to access deeper resources with lower drilling costs. DOE also supports advanced technology in heat conversion and power systems for application to a broad range of geothermal resources. Researchers work in partnership with U.S. industry to establish geothermal energy as an economically competitive contributor to the U.S. energy supply. DOE's R&D program and activities to reduce barriers to development will allow geothermal energy to supply electrical power and heat to homes and businesses across the country.
- Hydropower. DOE is funding the development of a new generation of hydropower turbines that will kill far fewer fish than current designs do, and will also maintain higher levels of dissolved oxygen in the water, which keeps river ecosystems healthier. Hydropower is an important form of zero-carbon electricity generation for the Nation.
- Hydrogen. DOE will continue to fund its research on low-cost hydrogen production and storage, prerequisites to the widespread use of hydrogen as a fuel. The program now looks toward the Proton-Exchange Membrane (PEM) fuel cells being developed for hybrid vehicles and for cogeneration in buildings as the first significant markets for hydrogen, which will be ready within 5 years. More than half of the hydrogen budget supports the new FreedomCAR public-private partnership.

The program funds R&D on thermal (steam and advanced auto-thermal reforming) production on hydrogen from both natural gas and biomass, and on methods to use either algae and bacteria or photocatalytic techniques to produce hydrogen. The hydrogen storage research program is exploring a number of novel adsorption mechanisms, including carbon nanotubes and improved metal hydrides. DOE's Technology Validation effort is funding demonstrations of prototype fuel cells, a fueling station for vehicles, and onsite storage systems for solar production of hydrogen. The latter includes a reversible electrolyzer/fuel cell that can produce hydrogen from electricity while the sun is shining, and electricity from hydrogen when it is dark.

• Deployment. DOE funds the Renewable Energy Production Incentive (REPI), which provides payments to public and non-profit utilities in lieu of renewable energy tax credits. Public and non-profit utilities are not eligible for these tax credits because they pay no taxes. DOE's International Renewable Energy program provides technical assistance to developing countries and U.S. industries to help them put together climate change projects. The program also funds market and trade development activities and works with other agencies to incorporate solar and renewable energy into disaster-relief programs.

• Transmission and Distribution. DOE funds development of advanced storage systems to supply ultra-high power quality to sensitive loads, smooth the power output form distributed generation sources including intermittent renewable sources, and enhance the reliability of the transmission and distribution systems. DOE also addresses power grid reliability, and efficient electricity market operation issues by developing real-time measurement and control systems for electric grid management. This work also investigates the use of load management techniques to mitigate emergency power shortages and price spikes. In order to promote and facilitate the integration of distributed sources into the grid, DOE funds development of uniform interconnection standards for distributed power generation, and funds studies to identify barriers to the wider use of distributed generation.

• High Temperature Superconductivity. DOE supports industry-led projects to capitalize on recent breakthroughs in superconducting wire technology, aimed at developing devices such as advanced motors, power cables, and transformers. These technologies would allow more electricity to reach the consumer without an increase in fossil fuel input.

• Distributed Energy Resources. DOE has combined the development of Distributed Energy Resources (distributed generation, energy storage and load management) into one office to lead the seamless integration of these technologies into the distribution system, the power grid, competitive markets, and the individual customer site. The office is supporting work to increase the efficiency, and reduce the cost and emissions of advanced natural gas-driven microturbines, fuel cells, and reciprocating engines, and developing advanced high temperature materials to improve their performance. High system efficiencies are achieved from these sources by linking them into building combined heat and power systems with advanced absorption heat pumps, chillers and desiccant systems that are also being developed in the program.

5. Carbon Sequestration

Carbon dioxide can be sequestered (stored) through changes in both forestry and agricultural practices. These programs focus on methods to capture and store carbon dioxide, measure and monitor carbon in soils and from agricultural practices, and to improve estimates of carbon fluxes from forests.

• DOE Carbon Sequestration Science Programs. The budget proposes $35 million, the same level as fiscal year 2002 enacted, for DOE carbon removal programs in the Office of Science. DOE's programs include research into the feasibility of capturing and storing carbon dioxide in underground geological structures and in the deep ocean.

• DOE Fossil Energy Carbon Sequestration Programs. The budget proposes $54 million, an increase of $22 million over fiscal year 2002 enacted, for DOE fossil energy carbon sequestration programs. Carbon sequestration is potentially one of the lowest cost approaches for significantly reducing or perhaps virtually offsetting greenhouse gas emissions. The purpose of the fossil energy program is to develop and demonstrate technically, economically, and ecologically sound methods to capture and reuse, store or permanently isolate carbon dioxide from the environment. The program goal is to make available sequestration options starting in 2015 at a cost of no more than $10 per ton of carbon (or about two tenths of a cent in the cost of electricity). When linked with new advanced clean coal power technologies now under development, the program will enable the deployment of clean coal power plants with essentially zero emissions.

The principal thrust of the carbon sequestration program is to develop the applied science and new technologies for addressing the cost-effective management/sequestration of carbon emissions from the production and use of fossil fuels. The program primarily selects research topics and projects through competitive solicitations involving industry, university, and national laboratory performers. Close collaborations with other DOE, government, industry, and international organizations are maintained providing an integrated approach to advancing the science and technology of carbon sequestration.

• EPA Carbon Removal Programs. The budget proposes $2 million, about the same level as fiscal year 2002 enacted, to allow EPA to enhance efforts to better

quantify the associated environmental co-benefits that result from carbon sequestration. These benefits include improving soil quality, reducing soil erosion, improving water quality, providing wildlife habitat, and enhancing other environmental and conservation goals. EPA will continue to collaborate with USDA to address the misperceptions regarding carbon sequestration and to ensure that this important mitigation option is developed in an environmentally sound and economically efficient way. EPA and USDA will identify and develop specific opportunities to sequester carbon in agricultural soils, forests, other vegetation and commercial products.

• USDA Technology Research. The budget proposes approximately $6 million to strengthen basic climate change technology research and to develop methods for measuring carbon in soils. USDA's Agricultural Research Service (ARS) will develop methods to manage crops, soils, and grazing systems to achieve the best balance of agricultural productivity, resource conservation, and carbon sequestration. Work will also focus on methods for managing livestock to minimize methane emissions. The Forest Service will support the development of measuring tools and monitoring technologies to improve estimates of carbon fluxes from forests.

INTERNATIONAL ASSISTANCE

Table 6. International Climate Change Assistance

(Discretionary budget authority; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Agency for International Development:.				
Development Assistance (DA)	112	110	109	-1
Economic Support Fund (ESF)	—	12	6	-6
Assistance for the Independent States of the Former Soviet Union (FSA)	31	32	27	-5
Assistance for Eastern Europe and the Baltic States (AEEB)	13	10	8	-2
International Disaster Assistance (IDA)	—	4	5	+1
Development Credit Authority (DCA)	1	—	—	—
Tropical Forest Conservation[1]	—	—	50	+50
Subtotal—AID	157	167	205	+38
Department of Treasury.				
Debt Restructuring Tropical Forest Conservation[2]	13	5	—	-5
Department of State.				
International Organizations and Programs	7	7	6	-1
Total[3]	177	179	211	+32

[1]Prior to the fiscal year 2003 Presidents Budget request, funding for the Tropical Forest Conservation Act (TFCA) was appropriated to the Treasury Department.
[2] In fiscal year 2002, an additional $20 million in existing balances may be used.
[3] Total may not add due to rounding.

U.S. Agency for International Development (USAID). The budget proposes $205 million, an increase of $38 million over fiscal year 2002 enacted, for USAID's climate change programs and for tropical forest conservation. The goal of USAID's climate change programs are to promote development that minimizes the associated growth in greenhouse gas emissions and reduces vulnerability to climate change. To accomplish this goal, USAID works in developing and transition countries to implement "win-win" solutions that provide climate-related benefits while also meeting development objectives in the energy sector, urban areas, forest conservation, agriculture, and disaster assistance. These solutions include activities that: 1) promote the transfer of clean energy technologies; 2) measure reductions in greenhouse gas emissions; 3) promote carbon capture through improved land use; 4) support countries to participate more effectively in the U.S. Framework Convention on Climate Change; and 5) assess vulnerability to the impacts of climate change and increase adaptive capacity. Although USAID works on climate change issues in more than 40 countries, the Agency has focused its climate change activities in three sub-regions: Central Africa, Central America and Central Asia, and eight countries: Brazil, India, Indonesia, Mexico, Philippines, Russia, South Africa, and Ukraine.

The President's fiscal year 2003 budget proposal seeks $50 million in funding for tropical forest conservation, of which $40 million may be used for the Tropical Forest Conservation Act (TFCA). One purpose of this initiative is to enable developing

countries to play an increased role in addressing the world's climate change problem through storing carbon in forests. The main elements of the initiative will be: (1) remote sensing and developing capacity to monitor deforestation and enable local governments to better control illegal and destructive logging in their countries; (2) addressing the problem of illegal and destructive logging practices, working with governments, non-governmental organizations and private industry; and (3) addressing deforestation through the use of the Tropical Forest Conservation Act as well as other innovative funding mechanisms such as commercial debt for nature swaps under the Foreign Assistance Act Title I, Chapter 7 authority and new partnerships with U.S. industries and non-governmental organizations (NGO's).

Department of State. The budget includes $6 million to support the work carried out by the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC). The Secretariat is responsible for work related to the Convention and oversees the consideration of communications submitted by countries. The Panel's assessment efforts provide information on the scientific and technical underpinnings of domestic and international policies to combat the threat of global climate change, and its findings influence policy options available within and between countries.

OTHER CLIMATE-RELATED PROGRAMS

Table 7. Other Climate Change-Related Programs—FY 2003 Budget

(Budget authority; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Department of Energy.				
Energy Conservation R&D Weatherization & State Energy Grants	191	272	316	+41
Fossil Energy R&D (cleaner coal/natural gas)	274	442	398	-44
Energy Supply:.				
Nuclear Energy R&D (NERI)	34	32	25	-7
Subtotal—DOE	499	749	739	-10
Department of the Treasury.				
International Development Assistance Global Environment Facility[1]	41	38	68	+30
Total[2]	540	787	807	+20

[1]The total fiscal year 2003 request for the Global Environment Facility (GEF) is $177.8 million. Approximately 38 percent of total GEF funding from all sources supports climate-related projects (e.g. expanding clean energy production and efficient energy use). The GEF, which also provides funding for other global environmental concerns, does not allocate funds by project type.

[2] Total may not add due to rounding.

Other Climate-Change Related Programs. The fiscal year 2003 budget includes $807 million, an increase of $20 million over fiscal year 2002 enacted, for several programs in which there is, or can be, significant greenhouse gas co-benefits. These include programs that have multiple environmental benefits, including reducing fossil fuel use or improving energy efficiency. The programs in this category include:

- DOE—Low Income Weatherization and State Energy Grants. The budget proposes $316 million, an increase of $41 million over fiscal year 2002 enacted, for programs that facilitate energy efficiency investments at the State and local level. These programs provide energy conservation services, such as insulation, to low-income Americans, reducing energy costs for consumers, improving health and safety, and reducing carbon emissions. The State Energy Program provides grants that enable States to tailor energy efficiency programs to local needs and leverage non-Federal resources.
- DOE—Cleaner Coal and Natural Gas Efficiencies. The budget includes $398 million, a decrease of $44 million from fiscal year 2002 enacted, to support DOE's R&D effort to help industry develop advanced technologies to produce and use coal, and gas resources more efficiently and cleanly. federally funded development of clean, highly efficient gas-fired and coal-fired generating systems aims to reduce gas emission rates, while reducing electricity costs compared to currently available technologies. Programs also include efforts to discover effective, efficient, and economical means of sequestering carbon dioxide.
- DOE B Nuclear Energy Research Initiative (NERI). The budget proposes $25 million, a decrease of $7 million from fiscal year 2002 enacted, to continue investigator-initiated research and development at universities, national laboratories, and

industry to advance nuclear power technology. NERI research and development focuses on proliferation-resistant reactor and fuel technologies, high performance/efficient reactor technology, advanced nuclear fuels, and new technologies for the minimization and management of nuclear waste.

• Department of the Treasury B Global Environment Facility (GEF). See Addendum A.

DETAILED ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES

Table 8. Programs and Tax Policies Related to Climate Change—By Appropriation Account/Line Item—FY 2003 Budget

(Budget authority and tax incentives; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Programs and Tax Policies Directly Related to Climate Change				
U.S. Global Change Research Program (USGCRP).				
Department of Health and Human Services (HHS).				
National Institutes of Health (NIH).				
National Institute of Environmental Health Sciences	9	10	11	+1
National Eye Institute	14	17	18	+1
National Cancer Institute	31	34	39	+5
National Institute of Arthritis & Musculoskeletal & Skin Diseases	*	*	*	*
Subtotal—HHS/NIH[1]	54	60	68	+8
National Aeronautics and Space Administration.				
Science, Aeronautics, and Technology	1,176	1,090	1,109	+19
Department of Energy.				
Science (Biological & Environmental Research)	116	120	126	+6
National Science Foundation.				
Research and Related Activities	181	188	188	0
Department of Agriculture (USDA).				
Agricultural Research Service	29	30	30	0
Cooperative State Research, Education, & Extension Services.				
Research and Education	4	9	17	+8
Economic Research Service	1	1	1	0
Forest Service.				
Forest and Rangeland Research	17	17	17	0
Subtotal—USDA	51	57	65	+8
Department of Commerce.				
National Oceanic and Atmospheric Administration Operations, Research, and Facilities	93	100	100	0
Department of the Interior.				
U.S. Geological Survey Surveys, Investigations, and Research	27	28	28	0
Environmental Protection Agency.				
Science and Technology	23	21	22	+1
Smithsonian Institution.				
Salaries and Expenses	7	7	7	0
Subtotal—USGCRP[2]	1,728	1,670	1,714	+44
Climate Change Research Initiative (CCRI)				
Department of Commerce.				
National Oceanic and Atmospheric Administration Operations, Research, and Facilities	0	0	18	+18
National Science Foundation.				
Research and Related Activities	0	0	15	+15
National Aeronautics and Space Administration.				
Science, Aeronautics, and Technology	0	0	3	+3
Department of Energy.				

Table 8. Programs and Tax Policies Related to Climate Change—By Appropriation Account/Line Item—FY 2003 Budget—Continued

(Budget authority and tax incentives; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Science (Biological & Environmental Research)	0	0	3	+3
Department of Agriculture (USDA).				
Forest Service.				
Forest and Rangeland Research	0	0	1	+1
Subtotal—CCRI	0	0	40	+40
Technology Research, Development and Deployment				
Department of Energy (DOE).				
Energy Supply.				
Renewable Energy Resources R&D	375	393	408	+15
Nuclear Energy	(5)	(7)	(0)	(-7)
Energy Conservation R&D	619	649	588	-52
Fossil Energy R&D (sequestration R&D)	18	32	54	+22
Science (Basic Science)	35	35	35	0
Energy Information Administration	3	3	3	0
Subtotal—DOE	1,050	1,103	1,088	-15
Environmental Protection Agency (EPA).				
Environmental Programs and Management	96	89	91	+2
Science and Technology	27	26	17	-9
Subtotal—EPA	123	115	108	-7
Department of Agriculture (USDA).				
Forest Service.				
Forest and Rangeland Research	3	0	1	+1
Agricultural Research Service	0	0	5	+5
Subtotal—USDA	3	0	6	+6
Subtotal—Technology Research, Development and Deployment[3]	1,176	1,218	1,202	-16
Revenue Effect of Tax Proposals	0	0	555	+555
International Assistance				
Agency for International Development (AID).				
Development Assistance (DA)	112	110	109	-1
Economic Support Fund (ESF)	—	12	6	-6
Assistance for the Independent States of the Former Soviet Union (FSA)	31	32	27	-5
Assistance for Eastern Europe and the Baltic States (AEEB)	13	10	8	-2
International Disaster Assistance (IDA)	—	4 D5	+1	
Development Credit Authority (DCA)	1	—	—	—
Tropical Forest Conservation[4]	—	—	50	+50
Subtotal—AID[5]	157	167	205	+38
Department of Treasury.				
Debt Restructuring.				
Tropical Forest Conservation[6]	13	5	—	-5
Department of State.				
International Organizations and Programs	7	7	6	-1
Subtotal—International Assistance[7]	177	179	211	+32
Other Climate Change-Related Programs				
Department of Energy.				
Energy Conservation R&D	191	275	316	+41
Weatherization & State Energy Grants	274	442	398	-44
Fossil Energy R&D (cleaner coal & natural gas).				

Table 8. Programs and Tax Policies Related to Climate Change—By Appropriation Account/Line Item—FY 2003 Budget—Continued

(Budget authority and tax incentives; in millions of dollars)

	FY 2001 Actual	FY 2002 Estimate	FY 2003 Proposed	Change 2002–2003
Energy Supply.				
Nuclear Energy R&D (Nuclear Energy Research Initiative (NERI))	499	749	739	-10
Subtotal—DOE	499	749	739	-10
Department of the Treasury.				
International Development Assistance, Multilateral Assistance, International Financial Institutions—Global Environment Facility[8]	41	38	68	+30
Subtotal—Other Climate Change Programs[9]	540	787	807	+20
Total—All Programs and Tax Policies[10]	3,603	3,822	4,475	+653

Table 8 is a detailed listing of Federal climate change expenditures by agency with account level information as provided in the President's fiscal year 2003 Budget Appendix. All numbers represent budget authority unless otherwise noted. The line items in the Program and Financing schedule in the Budget Appendix use obligations, not budget authority, so the numbers may not be comparable.

* less than $500,000

[1] Subtotal may not add due to rounding.

[2] Subtotal may not add due to rounding.

[3] Subtotal may not add due to rounding.

[4] Prior to the fiscal year 2003 Budget request, funding for the Tropical Forest Conservation Act (TFCA) was appropriated to the Treasury Department.

[5] Subtotal may not add due to rounding.

[6] In fiscal year 2002, an additional $20 million in existing balances may be used.

[7] Subtotal may not add due to rounding.

[8] The total fiscal year 2003 request for the Global Environment Facility (GEF) is $177.8 million. Approximately 38 percent of total GEF funding from all sources supports climate-related projects (e.g. expanding clean energy production and efficient energy use). The GEF, which also provides funding for other global environmental concerns, does not allocate funds by project type.

[9] Subtotal may not add due to rounding.

[10] Total may not add due to rounding. Total adjusted to eliminate double counts.

ADDENDUM A

GLOBAL ENVIRONMENT FACILITY (GEF)—FY 2003 BUDGET REQUEST

The fiscal year 2003 Budget requests $107.5 million for the GEF for the first of four annual payments under the third GEF replenishment (GEF–3) and $70.3 million to clear one-third of the U.S. arrears to GEF–2. The clean energy portion of the GEF portfolio B its climate change focal area B accounts for about 38 percent of its financial commitments, which is about $68 million for climate-related activities in fiscal year 2003.

Background on the Organization

The GEF was created in 1991, before any climate convention or protocol existed, to specialize in trans-border environment problems, of which climate is only one. In addition to climate change, GEF funding is focused on international water pollution and overfishing; better forestry, wildlife management, and biological diversity conservation; and phasing out use of ozone-depleting chemicals (in Eastern Europe, to complement Montreal Protocol Fund work in developing countries).

The 1992 Climate Convention (the "1992 Convention") provided that there should be a "financial mechanism" to: (1) help developing countries evaluate, quantify, and report publicly on their greenhouse gas emissions; and (2) make investments in cleaner development in developing countries. In 1994, more than 3 years before conclusion of the Kyoto Protocol, the U.S. and other countries chose the GEF as the institution to run the financial mechanism of the Climate Convention, in part to avoid creating new institutions. The GEF was by far the best existing institution for the job.

By 1995, donors had concluded a first GEF replenishment that extensively restructured the GEF and improved its operational effectiveness. This restructuring also cemented a governance structure in which donors exercise much more power than in the 1992 Convention or in any standard "UN-configured" institution.

GEF Operations

The GEF focuses on innovative, cost-effective and generally small projects that can be duplicated elsewhere with financing from non-GEF sources. Since beginning regular operations in 1994, the GEF has designed and initiated over 1,047 investment and capacity building projects in over 161 countries that are now being implemented by developing countries with the help of three agencies—the World Bank, the U.N. Development Program, and the U.N. Environment Program. GEF has committed about $3.7 billion to date, leveraging over $15 billion from other sources. Cofinanciers include the developing countries themselves, bilateral aid agencies, the GEF's three implementing agencies and other multilateral financial institutions, and, in some cases, private sector investors and non-governmental organizations. Leveraging for clean energy projects is significant: $799 million in cofinancing was leveraged in association with $86 million in GEF grants in fiscal year 2002. GEF operations take two forms: (1) technical assistance to help developing countries frame more environmentally sound policies in key sectors such as energy production and land management; and (2) direct investments to demonstrate innovative technology projects, such as rural solar power, that countries then can copy on a larger scale.

No Projects That Are Kyoto-Specific

The GEF predates both the 1997 Kyoto Protocol and the 1992 Convention, and the Protocol places no new obligations on the GEF as the Convention's financial mechanism. With regard to development finance, the Protocol is related to the GEF through the Protocol's umbrella, the 1992 Convention, since the GEF acts as the financial mechanism for the Convention; it simply underscores existing 1992 Convention agreements on financial assistance for developing countries:

- Supporting developing country reporting requirements under the 1992 Convention; and
- Providing the extra cost over normal development costs of reducing greenhouse gas emissions in energy or other projects. For example, the GEF covers only the incremental cost of a clean wind power plant relative to a regular oil-fired plant of identical capacity.

GEF Climate Change-Related Clean Energy Activities

The GEF supports five categories of climate-change related projects, all but one focused on the energy sector. The first category is small activities (generally costing about $350,000) to assist countries in preparing reports required under the 1992 Convention. These reports provide detailed inventories of countries' greenhouse gas (GHG) emissions and sources (power plants, etc.), their GHG "sinks" (forests,etc.), and policies and programs that affect GHG emissions (energy pricing policies, etc.).

The four other categories, briefly illustrated with project examples below, all support clean energy development, usually combined with capacity-building for good policies and effective institutions. These programs make sense on their own terms and are all initiatives the U.S. has been pursuing domestically for years. None of them is directed by the Protocol.

The GEF already undertakes systematic annual portfolio performance evaluation. Criteria include quality of overall project management, financial management, policy impacts, country capacity development, civil society engagement, and pollution abatement. For example, for energy efficiency projects, evaluators compare investments in efficient equipment following the GEF intervention to a baseline scenario of efficiency investments. An extensive effort to update and improve measurement criteria at both project and program levels for climate change activities has been concluded. These measurements are now being used to ensure projects and programs achieve their objectives.

Promoting Energy Efficiency and Conservation

The GEF's Mexico High Efficiency Lighting Project aimed to reduce energy waste and power plant pollution by proving the commercial viability of energy efficient lighting. $10 million from GEF leveraged over $13 million in initial cofinancing. Since the project's completion, its long-term impacts have outstripped all expectations. Mexican consumers and businesses have installed almost 40 percent more efficient lights than the GEF's most optimistic projections. The project's success also convinced Mexico to expand dramatically energy efficiency programs in other locations and sectors.

Promoting Renewable Energy

In Sri Lanka, a GEF project has succeeded in supplying electricity by employing renewable technologies and demonstrating the advantages of such technologies to rural households and the country in general. This $5.9 million GEF grant has lever-

aged $49.4 million in cofinancing, including $24.2 million from the World Bank. Approximately 30 megawatts of mini-hydropower has been added to the grid through private developers, and a total of 8,800 households have been provided with electricity through village hydropower and solar photovoltaic power. The aim is to provide for the replication of such renewable energy schemes by private businesses in Sri Lanka and many other countries.

Lowering the Long-Term Cost of Advanced Clean Energy Technologies

The Brazil Biomass Power Commercial Demonstration Project uses high-efficiency technology to use agricultural byproducts as fuel for electric power and agro-industry process heat. A $40.5 million GEF investment leverages $82 million, mostly from Brazilian public and private sources. The project should help increase economies of scale for this promising technology and thus help it become commercially viable. By conservative estimates, biomass power could supply clean electricity to 100 million rural people, particularly needed in Africa and South Asia.

Clean Fossil-Fuel Combustion and Other Short-Term Measures

The GEF's $10 million Coal Bed Methane Project demonstrated at three sites a wide variety of techniques and technologies that Chinese coal mines can employ to reduce methane emissions and capture clean-burning methane as a fuel. It also spawned landmark policy and institutional reforms, including the creation of the China United Coal Bed Methane Corporation, that support replication of coal-bed methane recovery. The Chinese Ministry of Coal has since negotiated agreements with BP-Amoco and other companies for coal-bed methane projects. Based on the GEF's early work, the Asian Development Bank, Asia-Pacific Economic Cooperation, and the China United Coal Bed Methane Corporation are all working to expand coal-bed methane development in China.

ADDENDUM B

HIGHLIGHTS OF THE 2002 FARM BILL

Over the next 10 year we will invest $47.2 billion for conservation on our farms and forest lands, partnering with farmers and small land owners to protect the water and air, provide habitat for wildlife, and storing carbon in trees and the soil. The 2002 Farm Bill reauthorizes and increases funding for most USDA conservation programs. These programs will provide a range of environmental benefits, including improved air, soil, and water quality and wildlife habitat. Activities implemented through a number of USDA conservation programs can result in positive greenhouse gas benefits by reducing emissions and enhancing terrestrial carbon sequestration.

For example, the Environmental Quality Incentives Program (EQIP) program is expected to reduce greenhouse gas emissions by providing incentives that encourage the voluntary adoption of conservation practices on working lands and waste management systems for livestock operations such as methane capturing technologies. A new provision of EQIP, the Conservation Innovations Grant Program, could be used to promote carbon sequestration practices by leveraging private and public sector investments. In addition, reserve programs, such as the Conservation Reserve Program, are expected to have sizable greenhouse gas benefits, by sequestering carbon through vegetation growth and improved soil conditions.

Environmental Quality Incentives Program (EQIP) provides technical assistance, cost-sharing, and incentive payments for conservation practices on working lands. The 2002 Farm Bill increased funding for EQIP and increased the flexibility of the program by allowing exceptions to the maximum cost-share amount of 75 percent, removing restrictions on eligibility based on operation size, and expanding options for contract lengths.

While both crop and livestock producers are eligible, funding is prioritized for livestock producers with 60 percent of program funding targeted for conservation practices on livestock operations (up from 50 percent in the 1996–2001 Farm Bill).

The Conservation Innovation Grants program is a new provision under EQIP that allows the Secretary to make grants to governmental and non-governmental entities, as well as persons, to leverage investment in conservation activities. Projects funded through this program may include market-based pollution credit trading, adoption of best management practices, or carbon sequestration.

The 2002 Farm Bill provides for direct spending for regular EQIP activities and the Conservation Innovation Grants program of $5.8 billion in Commodity Credit Corporation (CCC) funding for fiscal years 2002–2007. Funding is scheduled to increase steadily starting at $400 million in 2002 and $700 million in 2003, increasing each year to a maximum of $1.3 billion annually by fiscal year 2007. This represents a substantial increase from the 1996 Farm bill authorization of $200 million per

year. Additional CCC funding is provided for a new EQIP provision targeting ground and surface water conservation at $310 million over fiscal year 2002–2007 and an additional $50 million is provided for water conservation activities in the Klamath Basin as soon as possible.

Reserve Programs compensate landowners for taking environmentally sensitive land out of production.

• Conservation Reserve Program (CRP) is a voluntary program where the government offers annual rental payments and cost-share assistance to farmers in exchange for taking land out of production and establishing an approved vegetation cover. The 1996 Farm Bill authorized a maximum enrollment of 36.4 million acres in the CRP. The 2002 Farm Bill reauthorizes the program and increases the enrollment cap to 39.2 million acres. Additional provisions allow for automatic extension of expiring contracts. In addition, 2002 Farm Bill provisions permit some management practices to continue on CRP lands (i.e., haying and grazing, and placement of wind turbines). Spending for this program is estimated to increase by $1.5 billion over 10 years.

• Conservation Reserve Enhancement Program (CREP) is authorized under the CRP but is administered through a State-Federal partnership and targets State-specific as well as National agricultural environmental problems. Because the CREP is authorized under the CRP, acres enrolled under CREP count toward the CRP enrollment cap. The estimated costs of the CREP are incorporated in the estimate above.

• Wetland Reserve Program (WRP) provides easements or restoration cost-share agreements to producers who agree to restore wetlands on agricultural lands. The 1996 Farm Bill authorizes a maximum area of 1.075 million acres. The 2002 Farm Bill increases the total enrollment acreage to 2.275 million acres, with a maximum annual enrollment set at 250,000 acres per year. Spending for this program is estimated to increase by $1.5 billion over 10 years.

APPENDIX A

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT

Global Climate Change Funding (GCC)

(Dollars in thousands)

BUREAU/COUNTRY	STRATEGIC OBJECTIVE NAME	Reporting Category	FY 2001 Obligations	FY 2002 Estimate	FY 2003 Proposed
Africa (AFR).					
Guinea	Increased use of Sustainable Natural Resources Mgmt Practices.	3	1,000	2,000	2,000
Madagascar	Biologically Diverse Ecosystems Conserved	3	2,500	2,500	2,500
Malawi	Sustainable Use, Conservation, & Mgmt of Renewable Natural Resources.	3	2,000	1,000	1,000
Mali	Increased Value-Added of Specific Economic Sectors.	3	1,000	1,500	—
	Accelerated Economic Growth	3	—	—	1,500
Mozambique	Increased Rural Household Incomes	3	2,000	2,000	2,000
Senegal	More effective Management of Services & Resources.	3	—	1,000	1,000
South Africa	Improved Capacity to Implement Economic Policy.	1	500	—	—
	Housing and Municipal Services	1	2,500	3,000	3,000
Uganda	Expanded Opportunities for Rural Sector Growth.	3	3,500	2,500	2,500
AFR/Regional/SD	Central Africa Regional Program for Environment (CARPE).	3	3,000	3,000	3,000
	(CARPE) Climate Monitoring & Observing	5	—	—	500
	FEWS Climate Monitoring and Observing	5	1,000	6,000	6,000
Western Africa Regional Program.	Food Security, ENV and Natural Resource Mgmt Strengthened.	3	1,000	—	—
	Climate Monitoring and Observing	5	—	—	500
Initiative for Southern Africa.	Increased Regional Cooperation in Natural Resource Mgmt.	3	—	500	500
	Climate Monitoring and Observing	5	—	—	500

Global Climate Change Funding (GCC)—Continued

(Dollars in thousands)

BUREAU/COUNTRY	STRATEGIC OBJECTIVE NAME	Reporting Category	FY 2001 Obligations	FY 2002 Estimate	FY 2003 Proposed
Regional Economic Dev. Service Office (REDSO/E).	Climate Monitoring and Observing	5	—	—	500
TOTAL AFR			20,000	25,000	27,000
Asia and the Near East (ANE)					
Afghanistan	Climate Monitoring and Observing	5	—	—	1,000
Bangladesh	Improved Performance of the Energy Sector.	1	1,000	3,470	3,470
	Improved Performance of the Energy Sector.	1	—	1,500	1,500
Egypt	Mgt. of Env. and Natural Resources in Targeted Sectors Improved.	1	—	7,280	1,155
India	Increased Environmental Protection in Energy, Industry, & Cities.	1	2,843	6,050	6,050
	Increased Environmental Protection in Energy, Industry, & Cities.	1	—	3,000	3,000
Indonesia	Energy Sector Governance Strengthened	1	3,823	3,130	3,130
Nepal	Increased Private Sector Participation & Investment in Hydropower.	1	2,000	2,200	2,200
Philippines	Protection of Productive Life Sustaining Natural Resources.	1	2,997	3,000	3,000
USAEP	U.S. Asia Environmental Partnership	1	4,100	2,000	3,100
SARI/E	South Asia Regional Initiative—Energy Program.	1	3,900	2,900	2,900
ANE/Regional	Program Development & Learning	1	—	150	150
	Climate Monitoring and Observing	5	—	—	1,000
TOTAL ANE			20,663	34,680	30,655
Latin American and the Caribbean (LAC)					
Bolivia	Sustainable Forest Management and Parks.	3	4,527	4,550	5,764
Brazil	Env & Socioeconomically Sustainable Alternatives for Sound Land Use.	3	2,500	1,465	2,840
	Clean and Efficient Energy Production and Use.	1	2,368	1,000	1,000
Dominican Republic	Sustainable Forestry	3	1,492	1,500	1,500
Ecuador	Conserving Ecuador's Forests	3	3,688	3,057	850
Guatemala	Conserving and Sustainable Using Forests	3	570	600	450
G-CAP (Central America)	Improved Management in the Mesoamerican Biological Corridor.	3	510	415	595
	Improved Management in the Mesoamerican Biological Corridor.	1	1,300	230	230
	Improved Management in the Mesoamerican Biological Corridor.	5	1,050	180	580
Honduras	Protecting Honduran Forests	3	3,691	2,600	4,800
LAC Regional	Improved Conservation of the Region's Biological Resources.	3	964	4,636	2,800
Mexico	Protecting Tropical Forest	3	4,164	3,365	4,765
	Renewable Energy, Energy Efficiency	5	600	400	500
	Fires	1	1,421	1,750	1,500
Nicaragua	Improving Park Management	3	4,970	4,723	1,129
Panama	Conserving Forests	3	240	—	—
Paraguay	Conserving Paraguay's Sub-Tropical Forests.	3	1,000	1,000	1,000
Peru	Improved Environmental Management	3	1,621	—	—
	Strengthen Environmental Management	3	—	1,227	1,500
TOTAL LAC			36,676	32,697	31,803

Global Climate Change Funding (GCC)—Continued

(Dollars in thousands)

BUREAU/COUNTRY	STRATEGIC OBJECTIVE NAME	Reporting Category	FY 2001 Obligations	FY 2002 Estimate	FY 2003 Proposed
Europe and Eurasia (E&E)					
Albania	Growth in Number of Self-Sustaining Private Enterprises.	1	1,500	750	500
Bulgaria	Special Initiatives	3	1,200	500	500
	Accelerated Development & Growth of the Private Sector.	1	—	400	450
Croatia	Growth of a Dynamic and Competitive Private Sector.	1	—	500	—
Romania	Economically Sustainable and Environmentally Sound Energy Sector.	1	1,100	1,900	1,500
CEE Regional	Economically Sustainable and Environmentally Sound Energy Sector.	1	7,576	5,726	4,901
	Increased Environmental Mgmt Capacity to Sppt Sustainable Ec Growth.	3	932	—	215
	Increased Environmental Mgmt Capacity to Sppt Sustainable Ec Growth.	1	214	—	87
Sub-total Europe			12,522	9,776	8,153
Armenia	Economically Sustainable and Environmentally Sound Energy Sector.	1	4,750	590	5,100
	More Sustainable Water Management for Enhanced Env Quality.	1	—	300	500
Georgia	Economically Sustainable and Environmentally Sound Energy Sector.	1	6,860	14,500	6,400
Kazakhstan	Improved Management of Critical Natural Resources, including Energy.	1	2,000	1,000	500
Kyrgyzstan	Improved Management of Critical Natural Resources, including Energy.	1	750	650	1,500
Moldova	Private Enterprise Growth Creates Jobs and Generates Income.	1	4,575	4,575	5,150
Russia	Accelerated Development and Growth of Private Enterprises.	1	400	883	718
	Cross-Cutting Programs	3	1,600	2,717	2,282
Tajikistan	Improved Management of Critical Natural Resources, including Energy.	1	—	20	30
Turkmenistan	Improved Management of Critical Natural Resources, including Energy.	1	10	200	200
Ukraine	Economically Sustainable and Environmentally Sound Energy Sector.	1	8,284	3,475	3,275
	Increased Env Mgmt Capacity to Support Sustainable Development.	1	1,645	460	
NIS Regional	Economically Sustainable and Environmentally Sound Energy Sector.	1	1,060	935	935
	Increased Environmental Mgmt Capacity to Spt Sustainable Ec Growth.	1	940	340	340
Sub-total Eurasia			31,229	31,830	27,390
TOTAL E&E			43,751	41,606	35,543
Economic Growth, Agriculture & Trade (EGAT).					
EGAT/ENV	Office of Environment and Natural Resources.	3	8,324	7,626	7,626
EGAT/ENV	Office of Environment and Natural Resources.	1	—	—	—
EGAT/ENV	Office of Environment, Energy and Technology.	1	16,000	12,000	10,000
EGAT/ENV	Global Climate Change	1	3,000	2,575	1,000

Global Climate Change Funding (GCC)—Continued

(Dollars in thousands)

BUREAU/COUNTRY	STRATEGIC OBJECTIVE NAME	Reporting Category	FY 2001 Obligations	FY 2002 Estimate	FY 2003 Proposed
EGAT/ENV	Global Climate Change	5	—	900	750
EGAT/ENV	Global Climate Change	3	3,000	500	325
EGAT/EGAD	AFS	3	2,022	2,775	2,775
EGAT/EGAD	AFS	3	3,000	3,000	3,000
TOTAL EGAT			35,346	29,376	25,476
Democracy, Conflict, and Humanitarian Assistance (DCHA)					
DCHA/OFDA	Worldwide Climate Monitoring and Observing 5.	—	4,000	5,000	
TOTAL DCHA			4,000	5,000	
Tropical Forest Conservation (A).			[13,000]	[5,000]	50,000
Development Credit Authority (DCA).					
Bulgaria (B)	1	625	—	—	
TOTAL DCA			625	—	—
TOTAL USAID			157,061	167,359	205,477

(A) Before the fiscal year 2003 Request, funding for the Tropical Forest Conservation Act was appropriated to the Treasury Department. In fiscal year 2002, up to an additional $20 million in existing Treasury Department balances may be used. The bracketed amounts are not included in AID's totals.

(B) Development Credit Authority is a competitive program funded by transfer authority. The fiscal year 2001 level is the subsidy amount obligated. The leveraged amount through fiscal year 2000 is $22.3 million.

FY 2002 Legislative Reporting Categories

1) Activities that promote the transfer and deployment of United States clean energy technologies: Under USAID's Climate Change Program, technology transfer is promoted to assist developing countries to achieve sustainable growth and development but is not tracked as an individual goal within the program. USAID's energy-related climate change programs demonstrate U.S. technologies and/or work to address the policy, legal and regulatory barriers that limit clean technology deployment.

2) Activities to assist in the measurement, monitoring, reporting, verification, and reduction of greenhouse gas emissions: USAID does not currently separate measuring, monitoring, reporting and verification of GHG emissions from the energy and land use sector activities in which these occur. All of the activities that assist with technology transfer and carbon capture promote the reduction of greenhouse gas emissions.

3) Activities/programs to promote carbon capture and sequestration measures

4) Activities/programs to help meet such countries' responsibilities under the Framework Convention on Climate Change: The spending for this category has not been formally tracked under USAID's Climate Change Program. It has been tracked as a performance indicator of program results and information concerning results through fiscal year 2000 and can be provided upon request.

5) Activities to develop assessments of the vulnerability to impacts of climate change and response strategies

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Responses of James Connaughton to Additional Questions from Senator Jeffords

Question 1. What measures should we look at to determine whether U.S. programs and resources are achieving the goals of Agenda 21?

Response. One measure of accomplishment is the ratification and implementation of new multilateral environmental agreements. The Bush Administration has submitted the Stockholm Convention on Persistent Organic Pollutants (POPs) and implementing legislation is to the Senate for its advice and consent. This convention seeks the ultimate worldwide elimination of certain persistent organic pollutants. Implementing legislation on two related international agreements have also be sent to the Congress: 1) The Protocol to the Convention on Long-Range Transboundary Air Pollution on Persistent Organic Pollutants, an earlier agreement similar to POPs which covers a slightly different set of chemicals already controlled in the U.S., and therefore applies only to the U.S., Europe and Canada; and 2) The Rotterdam Convention on the Prior Informed Consent (PlC) Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, which requires exporters to obtain the prior informed consent of importing countries and to provide safety information on health effects of hazardous substances and pesticides. Another important treaty concluded and ratified by the United States since Rio is the Deserts Convention (which deals with dry land management and desertification).

The international community has also developed a number of programs and other implementation measures to be undertaken by governments, the private sector and

NGO's. These include the U.S.-led international Coral Reef Initiative (ICRI), which now has a large number of participating countries, the U.N. Forum on Forests, which has made significant progress in developing a set of criteria and indicators for the sustainable management of the world's most endangered forest resources, and the Arctic Council, which as a group has identified and implemented measures to reduce toxic chemicals which pose a particular bioaccumulation risk in animals and humans in polar regions.

Programs implemented by U.S. industry often in partnership with government and NGO's, such as the Energy Star program for energy efficient appliances and the adoption of clean production technologies and methods have also contributed significantly toward achieving the goals set out in Agenda 21.

Sustainable development criteria related to Agenda 21 are being utilized in the reporting of program performance by U.S. Government departments and agencies. Goals for particular programs are drawn from specific chapters and sections of Agenda 21. An example is the goal of USAID's protected area work in Latin America, which addresses Section 15.5g of Agenda 21 by seeking to preserve biological diversity. Agenda 21 will continue to provide a broad framework as the U.S. executes targeted results-oriented programs that are designed to address local situations.

Question 2. We understand that earlier this year 41 American environmental leaders, including the heads of almost all of the major U.S. environmental groups, wrote to President Bush urging him to commit to attending the Johannesburg Summit and to reasserting American leadership on a range of critical global environmental issues. Their letter sets out a number of recommended actions. Has the Administration considered these recommendations and taken concrete actions on any of them?

Response. The Bush Administration greatly appreciates having heard from this group. I have, met with many of the NGO leaders who signed the letter to discuss these and other issues. The Administration is also working with many NGO's in preparing our deliverables for the World Summit. We have taken actions on implementing several international environmental agreements (as described above) At the recently completed talks for replenishment of the Global Environmental Facility (GEF) the U.S. pledged a significant increase in funding to help developing countries mitigate environmental problems with potential global impact. The United States pledged $500 million over the next 4 years for the Global Environment Facility (GEF). The commitment is a 16 percent increase over its contribution to the previous replenishment. This in turn will help leverage about $2.2 billion in total new donor contributions. My office and other agencies discussed the importance of this funding with several groups who I understand are complimentary of our ultimate decision and leadership.

Question 3. The United Nations Framework Convention on Climate Change commits the United States to working to achieve stabilization of greenhouse gases at concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Please provide the Administration's definition of what phenomena would indicate or constitute "dangerous anthropogenic interference." (For example, does that mean more frequent and more destructive hurricanes, excessive wildfires, anomalous droughts, etc.?)

Response. The objective of the Framework Convention, set out in Article 2, does not impose commitments on Parties. It does provide that the long term stabilization level "should be achieved within a timeframe sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner."

The Intergovernmental Panel on Climate Change notes in its Third Assessment Report that the question of what would constitute dangerous anthropogenic interference is one that it cannot answer, because danger is a function of the degree to which effects are negative and the degree to which those effects are unacceptable. The latter, as noted in the Third Assessment Report, is a value judgment. (IPCC Working Group II Third Assessment Report, page 917).

At this point, it not possible to make such a judgment. There remain substantial uncertainties in critical areas with respect to climate behavior, as well as natural and socio-economic impacts. These include, among other things:

- feedbacks in the climate system that determine the magnitude and rate of future increases; future usage of fossil fuels and future emissions of methane;
- how much carbon is sequestered by oceans and other sinks and how much remains in the atmosphere;
- the details of regional climate change resulting from global climate change;

- the nature and causes of the natural variability of climate, its interactions with forced changes, and the direct and indirect effects of aerosols;
- the ability of humans and ecosystems to adapt to changing climate conditions.

The Administration is taking measured and serious steps to respond to the challenge of climate change, by taking significant short-term measures to reduce the projected growth in global emissions, both through enhanced domestic policies and technology transfer to developing countries, and by substantially increasing our nation's investment in science and technology. By so doing, we can both reduce remaining uncertainties and prepare ourselves to address climate change in a manner that also ensures our continuing prosperity. We believe that these steps are fully consistent with the United States' commitments under the Framework Convention.

The President committed the Nation to an immediate goal of reducing America's greenhouse gas emissions relative to the size of our economy by 18 percent in the next 10 years. This will set America on a path to slow the growth of our greenhouse gas emissions and, if. science justifies, to stop and then reverse the growth of emissions. To achieve this goal, the Administration is actively engaged and moving forward on many fronts, looking at every sector of our economy, with the recognition that meaningful progress depends on the development and deployment of new technology. With the continued support of Congress, we are advancing climate science, developing and promoting energy efficiency, conservation, and sequestration technologies and practices, pursuing near term greenhouse gas mitigation programs and expanding international cooperation.

The President has called for nearly $700 million in additional funding for the Federal Government's commitment to climate change in Fiscal Year 1903—a 17 percent increase from last year—to support a $4.5 billion program of research on climate science and energy technology, mitigation incentives and programs, and international technology transfer and outreach. This commitment is unmatched in the world. The President's recent Report to Congress on Federal Climate Change Expenditures details the numerous programs that this funding will support.

Importantly, the President's request includes $555 million in clean energy tax incentives, the first part of a $4.6 billion commitment over the next 5 years, reaching $7.1 billion over the next 10 years. These incentives will spur investments in and purchases of renewable energy—including solar, wind, and biomass—as well as advanced hybrid and fuel cell vehicles, cogeneration, and landfill gas conversion. We also are promoting clean coal technology, as well as nuclear power—which produces no greenhouse gas emissions—and are working to safely improve fuel economy for our cars and trucks.

Question 4. Please identify the early warning system that the Administration supports domestically and internationally that is designed to detect when "dangerous anthropogenic interference" (as defined in response to the previous question) has begun to occur.

Response. The United States is involved in a variety of research activities designed to enhance our understanding of the climate system. Together, these will help reduce the significant remaining uncertainties identified last year by the National Academy of Science's in Climate Change Science: An Analysis of Some Key Questions, and provide better understanding of potential impacts associated with greenhouse gas emissions.

The Administration has requested $1.7 billion in basic scientific research, under the U.S Global Change Research Program and the President's Climate Change Research Initiative in fiscal year 2203, which is roughly half of the world's research budget, and more than Japan and the 15 member states of the European Union combined. This includes funding for the Climate Change Research Initiative, which is designed to focus on information that can be developed within 2 to 5 years to assist the nation's evaluation of optimal strategies to address global change risks.

In addition, the Administration is leading the way in the revitalization of a comprehensive global observation system, which is critical to understanding climate change. This includes greater emphasis on climate observation and monitoring systems here and abroad. As part of his climate change policy, the President committed $25 million to improve observing and monitoring capability in developing countries. These investments will help to better understand current conditions as well as improve future projections at the global level.

Question 5. The Framework Convention commits the United States and all the parties to reporting "detailed information on its policies and measures . . . with the aim of returning individually or jointly to their 1990 levels these anthropogenic emissions of carbon dioxide and other greenhouse gases." When will the United States comply with that commitment?

Response. The United States submitted detailed information on our policies and measures, in accordance with the procedures under the Convention. Most recently, policies and measures are detailed in the Climate Action Report submitted as the third National Communication from the United States to the U.N. Framework Convention on Climate Change, submitted in May 2002.

You mention as a "commitment" the Framework Convention's aim of returning to 1990 levels by the end of the last decade. This is not an obligation under the Convention, but rather is stated as a general objective. The last Administration ultimately found this general aim unachievable, as did virtually all of the developed country parties of the Convention. Article 4 of the Convention does, however, contain a number of specific commitments, with which the United States has fully complied. This includes the requirement for us to develop methodologies for assessing our greenhouse gas emissions and making that information publicly available. It includes the adoption of policies specifically aimed to mitigate greenhouse gas emissions and to develop programs to adapt to climate change that may occur, whether natural or human influenced. It commits us to develop and disseminate new technologies to reduce or prevent emissions, looking at all sectors. It commits us to promote the effective management and conservation of sinks in the agricultural and forestry sectors. It commits developed nations to provide assistance to developing nations to help them comply with their own obligations under the Convention. Finally, it commits all nations to report periodically to the United Nations on their compliance with these obligations, which the Bush Administration did recently through its Climate Action Report.

Question 6. Has the United States or any of its representatives, officially or unofficially discouraged countries from bringing climate change initiatives or issues to the World Summit for consideration?

Response. No. The United States delegation has engaged constructively on a substantial amount of text on a variety of climate change issues occurring in the Johannesburg Plan of Action. Most of the climate change-related text in the draft Johannesburg Plan of Action has been agreed upon. In addition the partnerships the U.S. will discuss in the areas of energy, agriculture and forests will also be quite consequential to the issue of greenhouse gas mitigation, even as they are directed at near-term poverty reduction and human health imperatives.

Several delegations have put forward textual proposals that have the effect of asking the United States to endorse the Kyoto Protocol, or to take on new climate-related commitments in the WSSD. The United States will not be a Party to the Kyoto Protocol, and we have indicated to those delegations that we cannot support text that is contrary to our national position. The United States does not intend to agree to additional climate change commitments at WSSD. The internationally agreed forum for negotiating climate change commitments is the U.N. Framework Convention on Climate Change. The Eighth Conference of the Parties to the Convention (COP–8) will take place October 23-November 1, 2002, in New Delhi, India.

Question 7. The Canadian government has put forward a Type I partnership entitled "Health and Environment: Moving from Knowledge and Experience to Action." The purpose of this initiative is to synthesize existing information on environmental health linkages and build on the capacity of developing countries to apply this knowledge, in a manner consistent with local conditions, to planning and policy-making at the national level. Will the U.S. support the Canadian initiative and if so, what resources is the U.S. planning to offer to ensure its success?

Response. The United States is currently considering the Canadian proposal. In general, the proposal parallels work that is supported by the Health and Environment Ministerial of the Americas, which was agreed to by the United States and all the governments of the Western Hemisphere. Further, the Canadian proposal supports the data sharing initiatives underway through the North American Commission for Environmental Cooperation.

One key issue that remains to be resolved is whether this should be categorized as a Type I or Type II initiative. As a Type II initiative, the United States may support the initiative. Type II partnership does not require the consensus of each Nation participating in the WSSD. If the Canadian proposal were to become a Type II partnership, current U.S. Government funding levels could support this activity. The United States will continue to work with the Canadian Government with a goal to coming to agreement in support of the proposal.

Question 8. I have heard that EPA and other agencies are in the process of developing a number of Type II partnership proposals that the U.S. delegation in Johannesburg will announce. Specifically, I understand that EPA is developing initiatives on drinking water/sanitation, clean air, and children's environmental health. What can you tell us about the status of these proposals? Will new financial resources be

earmarked in future budgets to ensure that these initiatives add value to existing development assistance and make a meaningful and lasting contribution to the WSSD process?

Response. We are in the final stages of designing partnerships proposals which we will announce in Johannesburg and discussed with prospective additional partners. All the partnerships will be based on current appropriated funding and are within the budget targets for fiscal year 04. The Administration will brief appropriators in Congress on the proposals before the World Summit. EPA and other agencies have participated in preparing the partnerships, especially in water. Specifically regarding children's health, EPA is exploring with USAID and the Department of Health and Human Services to develop a proposal for children's environmental health indicators. EPA is also consulting with the World Health Organization on possible collaboration.

Question 9. Given that EPA is a lead agency on a number of initiatives and proposals, will EPA Administrator Whitman participate personally in the WSSD and if so, what will her role be?

Response. EPA Administrator Whitman is scheduled to participate in the WSSD. She and several other high-level delegates from her agency will actively engage with their counterparts, work to forge lasting partnerships on U.S. development priorities, and identify opportunities for collaboration beyond the WSSD.

Question 10. How is the United States affected by the fact that we don't have a true environment minister?

Response. The Bush Administration has accorded Cabinet Rank status to the Administrator of the EPA. The U.S. EPA Administrator is recognized as a peer among her international ministerial colleagues.

STATEMENT OF MAURICE F. STRONG, CHAIRMAN, EARTH COUNCIL FOUNDATION

Distinguished Chairman, Honorable Senators, ladies and gentlemen. First let me say what a privilege it is for me to have the opportunity of testifying before these two important committees of the U.S. Senate as you consider issues which are at the center of my own life interests and concerns. It is particularly encouraging to know that you are addressing these issues at a time when the position of the United States of America in respect of them has never been more important to the human future.

We face an ominous paradox as the evidence of our destructive impacts on the earth's environment and life-support systems has become more compelling while there has been a serious loss of momentum in the political will to deal with them. The United States is at the center of this dilemma. Thanks largely to the leadership of the United States the world community has made impressive progress in its understanding of environment issues and their inextricable relationship with the economic development processes to which they give since the first global conference on the human environment convened by the United Nations in Stockholm in 1972 put the environmental issue on the international agenda. The world has looked to the United States for leadership in its national policies and legislation and in development of the system of international cooperation, conventions and agreements through which governments have sought to cooperate in managing issues that even the greatest nations cannot manage alone.

The recent retreat by the United States from its long standing role as the leading driver of these issues, as particularly evidenced by its withdrawal from the Kyoto Protocol of the Climate Change Convention, threatens the progress that has been made in collaborative management of our environmental problems in the past 30 years and the prospects for the further progress that is so essential to our common future. This has cast a cloud over prospects for the World Summit on Sustainable Development which will convene next month in Johannesburg, South Africa and the unique opportunity it provides to give new impetus and momentum to the processes of international cooperation which the effective management of these issues requires. Thus your hearings are especially timely and important.

If I now speak candidly of some of the concerns I share with many others as to the position of the United States on the issues you are now addressing I do so not as a critic but as a long standing and committed friend of the United States with a deep affinity and admiration for the values and qualities that have made this such a great nation. Sharing these concerns as to the unilateral withdrawal by the United States of its support for international agreements and negotiating processes in which it has been such an active and influential participant, is not in any way to question its right to do so. Indeed it is understandable that with a new Administration and Congress the United States would take a new look at and bring new

perspectives to bear on these issues, also that in its preoccupation with the war on terrorism and other urgent issues it is taking your Government some time to develop its position on these matters.

I have great confidence in the sound instincts and values of the American people which in poll after poll affirm the continuing priority they accord to the environment issue and that through the processes of American democracy this will ultimately be reflected in the actions and policies of their Government. At the same time I must confess my deep concern as to the signals that have emerged thus far of the nature and the direction of the changes that are now in process.

It is particularly germane that this hearing is focusing on the international agreements and negotiating processes to which the United States is a party. These are perhaps the best indicators of the current State of political will toward international environmental cooperation and the prospects of revitalizing and strengthening it.

Let me review briefly the larger context in which I view the importance of your consideration of these issues.

At the United Nations Conference on the Human Environment held in Stockholm in 1972, the first global intergovernmental environmental conference, we lost our innocence. We recognized that much of what we had been doing in pursuit of our economic goals had, however inadvertently, been producing environmental damage and social dichotomies, which were undermining our quality of life and prospects for the future. The eyes of the more developed countries were opened to the very different perspectives and priorities of the majority of the world's people living in developing countries where the daily struggle for relief from poverty and progress toward a better life through development are the overriding priorities. As Prime Minister Indira Gandhi in her memorable statement to the Conference stated, in developing countries "poverty is the greatest polluter".

The Declaration and Plan of Action agreed following intense negotiations at Stockholm recognized in a number of important respects the need to create a positive synthesis between the environment and economic development.

It is, after all, through our economic behavior and practices that we have our impacts on the environment and these impacts affect our social as well as our physical environment. From this insight has emerged the concept of sustainable development, the process by which we bring the economic, environmental and social dimensions of the development process into appositive synthesis. Sustainable development should therefore be seen as the means by which our security, prosperity and well being can become secure and sustainable rather than as an end in itself.

Britain's Prime Minister Tony Blair said recently, "you don't have to be an expert to realize that sustainable development is going to become the greatest challenge we face this century".

The Stockholm Conference gave rise to a proliferation of initiatives—establishment in virtually all countries of environmental agencies, policies and regulations; a broad range of international treaties and agreements and an explosion in the number of environmental non-governmental organizations and citizen movements as well as a major expansion of the environmental programs of international organizations. The United Nations General Assembly in December 1972, based on the Conference's recommendation, established the United Nations Environment Program as the centerpiece of the emerging global network of environmental actors to lead the process of following up and implementing its results.

Since 1972 we have learned a great deal more about the nature and the causes of our environmental dilemma and have made notable progress in developing the technologies, the tools and the capacities to manage these problems successfully. Indeed there have been many individual success stories which demonstrate that it is possible to bring our economic life into a positive balance with our environmental and social systems through the transition to a sustainable development pathway.

By the mid–1980's some of the momentum generated by Stockholm had subsided. Progress toward achieving the environmental objectives set there was lagging. In response the United Nations General Assembly decided to establish a World Commission on Environment and Development headed by Norway's former Prime Minister Gro Harlem Brundtland. The Commission's report in 1987, Our Common Future, made a compelling case for sustainable development as "the only secure and viable pathway to the future of the human community". With the political impetus generated by the Brundtland Commission, the U.N. General Assembly decided to convene on the 20th anniversary of the Stockholm Conference in 1992 a Conference on Environment and Development and accepted the invitation of Brazil to host it.

Now known as the "Earth Summit" the Conference held in Rio de Janeiro in 1992 brought together more heads of government that had ever before assembled as well as an unprecedented number and range of civil society actors and media representatives. The Earth Summit agreed on a Declaration of Principles building on the

Stockholm Declaration, a comprehensive program of action—"Agenda 21"—to give effect to these principles and Conventions on Climate Change and Biodiversity which provided the framework for continuing negotiations following Rio. It also mandated a negotiating process that led to the completion since then of the Convention to Combat Desertification.

As you know the United States has ratified the Climate Change Convention and the Desertification Convention and in spite its withdrawal from the Kyoto Protocol it is still bound by its adherence to the Climate Change Convention to reduce its green house gas emissions. Although it has now opted to do this outside of the Kyoto Protocol the world community continues to look to the United States for the kind of parallel actions that will correspond to and hopefully exceed, the targets and timetables provided for by Kyoto.

While the results of the Earth Summit inevitably fell short in some important respects of the ambitious expectations that we had for it, the agreements it produced nevertheless provided the basic foundations and guidelines for the transition of the world community to a sustainable development pathway. And the fact that there were agreed by virtually all world governments, most of them at the level of their leader, gave them a high degree of political authority. Nevertheless, as I cautioned in my closing remarks to the Conference, it did not guarantee their implementation. Unfortunately, this proved all too prophetic.

Agenda 21 provides a comprehensive road-map for the transition to a sustainable development pathway. Although it does not carry the force of law the fact that it was agreed by all the governments of the United Nations, most of them at the level of their heads of State or Government, gives it a high degree of political authority. While its implementation has thus far been and on the whole disappointing, it has nevertheless served as a basis for the adoption of their national Agenda 21 by a number of governments of which China was one of the first. It has also inspired the establishment of local Agendas 21 by more than 3000 cities and towns throughout the world and such important industries as the tourism and travel and the road transport industries. It is particularly important that at Johannesburg governments re-affirm their commitment to Agenda 21 and to strengthening and building on it in those areas in which it is still inadequate or incomplete.

The risks to the future of the earth's environment and life-support systems identified in Stockholm and elaborated in Rio de Janeiro remain, while the forces driving them persist—increased population concentrated in those countries least able to support it, and even greater increases in the scale and intensity of the economic activities which impact on the environment. These have reached a point in which we are literally the agents of our own future; what we do or fail to do, will in the first decades of this new millennium in all probability, determine the future course of human life on earth. It is an awesome responsibility the implications of which we have not yet recognized. Certainly they have not yet been reflected in our policies and priorities.

As an optimist I continue to believe that the necessary change of course is possible. But as a realist I am deeply concerned that despite all the knowledge we have gained and progress we have made we have still not demonstrated the degree of political will or sense of priority that such a transition requires.

The transition to a sustainable development pathway is, I submit, as essential to the future of the human community today as it was before the tragic terrorist attacks of September 11th, 2001, on New York and Washington. The preoccupation with the ominous consequences of these horrendous acts is understandable and, indeed, necessary. But we must not allow this to sidetrack or undermine our efforts to achieve economic, environmental and social sustainability and security.

The tragic events of September 11th dramatically brought home to us that the phenomena we now refer to as globalization, which has opened up so many new and exciting opportunities, has also united us in facing a new generation of risks, imbalances and vulnerabilities. Risks to our personal security, the security of our homes, offices and communities and, more fundamentally, risks to the earth's' life-support systems on which the survival and well being of the entire human family depends. These risks and vulnerabilities are inextricably linked through the complex, systemic processes of globalization by which human activities are shaping our common future. They cannot be understood or dealt with in isolation. Nor can they be managed alone by any nation, however powerful. Indeed, they require a degree of cooperation beyond anything we seem yet prepared to accept.

Stockholm, in its historic Declaration stated that "to defend and improve the human environment for present and future generations has become an imperative goal for mankind—a goal to be pursued together with, and in harmony with, the established and fundamental goals of peace and of worldwide economic and social development". It thus pointed up the systemic linkages between the environment

and the issues of peace and security, economic and social development through which human activities are shaping our common future.

In a 1973 Foreign Affairs article I stressed that the principal insight arising from the Stockholm Conference was the need for a ecological, systemic approach to the management of the issues through which we are impacting on our own future. This is essential to our understanding and management of the broader complex of issues and processes that we now generally refer to as globalization.

The September 11th, 2001 tragedy demonstrated dramatically the vulnerabilities of even the most advanced and powerful of societies to destructive attacks, however misguided, by relatively small groups of alienated people. This underscores the need for international cooperation, not only to conduct the war against terrorism, but also to deal with the whole complex of issues integral to the globalization process. These include eradication of poverty, environmental protection, notably the risk of climate change, meeting the development and security needs of developing countries, and redressing the gross and growing imbalances that divide rich and poor and nourish the enmities and frustrations that are the seedbeds of conflict.

Peace and security are an indispensable pre condition to sustainability and overcoming poverty. War and violent conflict produce devastating damage to the environment. And the human costs of such wars and conflicts go far beyond the immediate deaths and suffering that result from them in destroying and undermining the resources on which even larger numbers of people depend for their livelihoods. This essential link between peace and sustainable development is the reason that United Nations Secretary-General Kofi Annan undertook to revitalize the University for Peace headquartered in San Jose, Costa Rica, and that it has established a strategic partnership with the Earth Council to re-enforce its capacities in the field of environmental security.

International cooperation is as indispensable to the effective management of the other elements of the globalization process as it is to the prevention of terrorism. But cooperation based on coercion will not long be effective. Sustainable cooperation requires a true sharing in the decisionmaking and in responsibilities on the part of the majority of nations which can only be achieved if the major nations of the world take the lead. We regret the retreat from multi-lateral cooperation on these issues on the part of the United States which has performed such immensely valuable service to the world community in leading it so effectively through most of the period since World War II. No individual Nation in the position to replace the United States in this role and while we continue to hope for and expect the return to leadership on the part of the United States, we cannot afford at this critical time to allow a leadership vacuum to prevail which would put at risk the very future of life on earth as we know it. There are some encouraging first signs of the emergence of a new configuration of leadership in the ratification by the European Union, and Japan of the Kyoto Protocol to the Climate Change Convention despite its repudiation by the United States. I look to my own country, Canada, to do so too.

The need for new and revitalized leadership is reinforced by the sobering realization that much of what has been agreed in the past has not been implemented and there is a disturbing tendency even to back-track on past agreements. It is important to be reminded that Principle 21 of the Stockholm Declaration in affirming the right of States to develop their own resources in accordance with their own environmental policies, have the "responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond their limits of national jurisdiction". Implementation of this principle would in itself require those States which are contributing disproportionately to the deterioration of the global environment, as for example in continuing to produce more than their share of green house gas emissions, to take the measures required to reduce their impacts. This responsibility is at the very heart of the challenge to the new generation of leadership which must be faced at Johannesburg.

The power and the influence of the United States in today's world is unrivaled and indeed without precedent in history. This gives the United States a freedom of action not enjoyed by other nations. Other nations are not in a position to hold the United States accountable for the performance of its obligations under international law. Nevertheless when it does act unilaterally it inevitably pays a cost in terms of the resentment and reluctance of others to cooperate on other issues of importance to the United States. It is important to note that already there is clear evidence that even traditional friends of the United States have not followed it in opting out such important international agreements as the Kyoto Protocol, the Land Mines Convention and the International Criminal Court. This is a departure from their longstanding practice of following the U.S. lead even in instances where they are not entirely comfortable with it.

The unprecedented power of the United States carries with it unprecedented responsibility, particularly at a time when the human future depends on the actions we take or fail to take in this generation. When the United States acts selectively to carry out its international obligations or to force other nations to carry out theirs it serves to undermine the credibility and effectiveness of international law which is the indispensable foundation for world peace, security and order. As the principal architect of the system of international treaties, conventions and agreements which constitute the current imperfect but indispensable international legal regime and the only Nation capable of insisting on enforcement, what the United States does or fails to do is an immense and often decisive influence on the behavior of other nations. The world community must be grateful to the United States for having for most part exercised its responsibility admirably. But in those instances in which it has not done so or has insisted only selectively on enforcement by others of their international obligations, this is an understandable cause of concern, even dismay, on the part of other nations for its weakening effect on the entire process of international law and prospects of its equitable enforcement.

In drawing the lessons of our experience in the last 30 years, it is clear that we have made a great deal of progress, notably in improving but by no means resolving, the more immediate and visible environmental conditions in the more industrialized countries. Impressive improvements have been effected in the environmental performance of industry and in development of technologies which promise solutions to most problems as, for example, the prospect of emission-free motor vehicles and the transition to a hydrogen-based energy economy. At the same time, developing countries have become more aware of and concerned with the environmental problems which inhibit their own development. These problems exact immense human and economic costs, produce deteriorating conditions in their cities, and destructive exploitation of the natural resources on which future development depends. They undermine the immense challenge of meeting their growing needs for water and ensuring its quality, prevention and care of destructive and debilitating diseases, and most of all their primary need to lift their people out of the quagmire of poverty. Yet developing countries which are custodians of most of the world's precious biodiversity resources are expected to care for them with only sporadic and limited support from industrialized countries. As their economies grow they will contribute increasingly to the more remote and less visible global problems for which the industrialized countries are largely responsible, notably the risk of climate change which affects the interests and the future of all nations.

Despite progress on many fronts, the environmental health of the earth which was first diagnosed at Stockholm has deteriorated overall since then while the forces driving it persist-increased population, primarily concentrated in developing countries, and even greater growth of the world economy. The benefits have been largely concentrated in industrialized countries, even as newly developing countries, notably China, are now accounting for an increasingly large share of the global economy.

As their economies grow, developing countries are finding that the environmental impacts of their development are undermining the purposes of development and exacting a heavy cost in terms of impacts on their natural resources, human health and productivity. At the Stockholm Conference developing countries made clear their willingness to participate in international environmental cooperation insisted that they required "new and additional resources" to enable them to do so. This has been a constant refrain in all international fora in which these issues are discussed and negotiated since then.

One of the most disappointing trends since the Earth Summit in 1992 has been the lack of response by OECD countries to the needs of developing countries for the additional financial resources which all governments at Rio agreed were required to enable them to make their transition to a sustainable development pathway and to implement international agreements. What has been particularly discouraging is that progress toward meeting with these needs has been further set back since Rio as a number of donors have reduced their Official Development Assistance. Thus the commitment by the United States and others at a recent United Nations Conference in Monterrey to increase their assistance is a welcome signal. This should not be seen as charity but as a necessary investment in our own environmental security. An especially urgent priority is to complete agreement on replenishment of the Global Environment Facility, the only new source of funding the environmental needs of developing countries to result from the Earth Summit.

With the reductions in Official Development Assistance we must be more innovative in motivating private capital—now the principal source of financial flows to developing countries-to contribute more to meeting their environmental and sustainable development needs.

We have for the first time in history the capacity to meet these monumental challenges. Indeed, on a global basis we are the wealthiest civilization ever and have the capacity to produce wealth at an unprecedented rate. It is clearly a question of how we set our priorities for the use of our wealth. Business leaders at Rio made the point that our current approach to setting those priorities is not sustainable-that we must "change course". And I am convinced that if we do not make this change of course in the first years of this new millennium the prospects for the world's future will be ominous indeed.

Much of what we must do to meet these formidable challenges has already been articulated and agreed at Stockholm, Rio and various other international for a and affirmed in a variety of international agreements. But implementation depends on motivation and this is at the heart of our current dilemma. Most of the changes we must make are in our economic life. The system of taxes, subsidies, regulations and policies through which governments motivate the behavior of individuals and corporation continues to incent unsustainable behavior.

At the deepest level, all people and societies are motivated by their moral, ethical and spiritual values. To build on these a set of basic moral and ethical principles which are broadly acceptable is certainly not easy. But a process that has taken several years and involved millions of people around the world has succeeded in producing a "peoples" Earth Charter as a major contribution to establishing the moral and ethical foundations for sustainable development.

I am pleased to say the United States has been deeply involved in the Earth Charter movement. The distinguished, American Professor Steven Rockefeller, chaired the committee which drafted the Charter in cooperation with people of different faiths and beliefs throughout the world. Some 500 organizations in the United States have joined with thousands around the world which have contributed to and/or endorsed the Earth Charter. These include the Humane Society of the United States, the National Audubon Society, the National Wildlife Federation, the Orion Society, the Sierra Club, the World Resource Institute, the Yale University School of Forestry and Environmental Studies and the United States Conference of Mayors as well as dozens of individual cities and towns.

The environmental movement has its roots in the concerns and initiatives of people well before it moved on to the agendas of governments. Today the primary impetus to environmental action and responsibility comes from civil society, with the support of scientists and the increasingly constructive engagement of industry. The alarm bells being sounded by some sectors of industry as to the high costs to economy of environmental measures, notably the reductions in greenhouse gas emission called for under the Kyoto Protocol, are countered by the increasing in evidence that such measures open up more new opportunities for industry than they negate.

Surely we must accept that the benefits of environmental security and sustainability are well worth and indeed less expensive that the ultimate costs of inaction. The United States has long accepted the high costs of maintaining its military strength and indeed this has produced an important economic spin-offs as for example in driving United States leadership in development and application of new technologies. I am convinced that in applying the same approach, the costs of environmental security would produce even more opportunities and benefits to the economy.

What, then, can be expected from the Johannesburg Summit? First and foremost there must be no retreat from the agreements reached at Stockholm, Rio de Janeiro and other international fora and the many legal instruments to which they gave rise. Indeed it is important that there be a strong re-affirmation by governments in Johannesburg of their commitments to these past agreements and to implementing and building on them in the post-Johannesburg period. In this respect, the position of the United States will be pivotal.

An a priori requirement for this is the successful completion of agreements on the issues that were left on resolved in the final preparatory meeting in Bali, Indonesia. It is now too late in the process to seek consensus on new initiatives but not too late to place new initiatives on the table in Johannesburg. These could include:

- A commitment to strong support for United Nations Secretary General Kofi Annan in strengthening the capacities and coordination of the organizations, programs and agencies of the United Nations which deal with the environment, poverty alleviation, and sustainable development.
- A call for the establishment of a Consultative Group on Clean Energy (CGCE), or similar entity, drawing on the successful experience of the Consultative Group on International Agriculture Research (CGIAR). Its purpose would be to provide an international consultative mechanism, not a new organization, to facilitate private-partnerships in identifying priorities for research and development of sustainable energy technologies, particularly those most relevant to the needs and interests of developing countries. It would also help mobilize and deploy the financial and tech-

nological assistance required to ensure their availability to developing countries under conditions conducive to their adoption and use.

- A call for governments to undertake a review of the system of fiscal, tax and other incentives, regulations and policies through which they motivate the behavior of individuals and corporations to provide positive incentives for environmentally and socially sound and sustainable development.
- Recognition of the Earth Charter as an important expression of the commitment by civil society of the world and ethical basis for sustainable development.

The convening of this hearing by your two extremely important and influential committees demonstrates your deep sense of the interest in and responsibility of the United States for its position on these issues. Recognizing that their fundamental nature does not lend itself to quick or easy solutions, there are none-the-less some very practical measures which you could undertake to make an important contribution to resolving them. You are, I understand, about to receive a report by the General Accounting Office of the current status of existing international agreements and their implementation. These could provide the basis for mandating a continuing process of monitoring, adherence to and performance under such agreements by the United States and others. The results could be incorporated in periodic reports very much like the reports that the State Department issues in respect of human rights. Such a monitoring and reporting system would provide an important stimulus to implementation of both the letter and the spirit of these agreements.

Developing countries face very special constraints both in negotiating and implementing international agreements because of their lack of sufficient financial resources to support the professional and technical expertise that this requires. Yet their active participation in and adherence to these agreements is essential to their effectiveness. A very modest investment by the United States in supporting the strengthening by developing countries of their own capacities to negotiate and service, these agreements would represent an important contribution to alleviating one of the main obstacles to negotiating and implementing them effectively. It would also require only a very modest investment to increase support for the international secretariats which are responsible for the servicing of such agreements. Of course, others would follow the U.S. lead if it were to take such initiatives. This could be a small but important step toward the revitalization of U.S. leadership.

If the United States were to take a lead in presenting or supporting such initiatives it would have an immense impact on prospects for success at Johannesburg.

This threats face in common from the mounting dangers to the environment, resource life-support systems on which all life on Earth depends are as great or greater than the risks we face of conflicts with each other. The revitalization of the system of international cooperation of which the United States was the primary architect is the only feasible basis on which we can manage the risks and realize the immense potential for progress and fulfillment for the entire human family which is within our reach.

All people and nations have in the past been willing to accord high priority to the measures required for their own security. We must give the same kind of priority to civilizational security and sustainability. This will take a major shift in the current political mind-set. If this seems unrealistic in today's political context we should recall that history demonstrates that what seems unrealistic today becomes inevitable tomorrow. Necessity will compel this shift eventually the question is can we really afford the costs and the risks of waiting. Most of all we need the renewed leadership of this great nation. I commend you for this encouraging manifestation that this renewal is well under way.

SUPPLEMENTAL TESTIMONY PROVIDED BY MAURICE STRONG, EARTH COUNCIL INSTITUTE

THE INTEGRATION OF ANIMAL PROTECTION AND RIGHTS INTO OUR ENVIRONMENTAL CONCERNS

It is important that the United States provide leadership and support to binding international agreements that protect animals and their environment. Fundamental principles such as transparency, binding dispute resolution, enforcement measures, and the precautionary approach should always be supported and advanced by the United States when such principles are absent from multi-lateral environmental agreements.

Moreover, where there is evidence of the pernicious and ever-growing practice of "vote-buying", one country providing foreign aid to developing countries in exchange for favorable votes, the United States is in the best position to put an end to such egregious practices. For nothing more quickly undermines a treaty and erodes inter-

national cooperation than when one country exacts another's allegiance in return for financial aid.

While progress in protecting animals has been made—and the United States should be congratulated for its contribution to this—enormous challenges still lie ahead. There are several key agreements that the United States has yet to ratify and others where it and others need to work harder in order to prevent the weakening of significant gains already achieved.

International Whaling Commission (IWC)

There has been subtle erosion of The United States' strong anti-whaling position over the last several years. It is imperative that the United States become a leader once again in the fight to protect whales from an inhumane commercial slaughter. The U.S. Delegation to the IWC should continue to make all efforts to prevent the lifting of the commercial whaling moratorium and institute tough measures against those countries that continue to kill whales and undermine the agreement. Further, I would strongly urge the United States to advocate a global whale sanctuary, as it is the only way to ensure that whales will be a part of our future.

Inter-American Tropical Tuna Commission (IATTC)

In 1997, despite opposition from a large coalition of animal and environmental protection organizations, U.S. Legislation was passed that weakened the definition of the well-known and trusted dolphin-safe label. The new label, if implemented, will allow the chasing, harassing and encircling of dolphins with nets as a method of catching tuna and still be labeled as dolphin-safe. As a result, dolphins will get caught in these nets and drown. If the label is weakened, consumers will feel betrayed when they learn that the dolphin-safe label no longer means what is stated on the can. The United States should not, I submit, be promoting a weakened dolphin-safe label to appease the fishing industry of another country. Rather the U.S. Delegation to the IATTC should be protecting dolphins and U.S. consumer concerns by arguing for the non-encirclement of dolphins by all countries participating in the Convention and fishing in the Eastern Pacific Ocean.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

The United States has continued to take a leadership role in implementation of the CITES treaty, both domestically and abroad. The next Conference of the Parties, scheduled for 315 November 2002, will consider several proposals submitted by the United States, that, if passed, will enhance protection from international commercial trade for species ranging from turtles to seahorses to cacti. The United States is expected to oppose proposals to allow international commercial trade in the meat and blubber of minke and Bryde's whales (proposed by Japan) and hawksbill sea turtle shells (proposed by Cuba).

However, there is deep concern that United States may waiver from its longstanding position in opposition to the international elephant ivory trade. With United States support, CITES banned the international ivory trade in 1.989 after a decade of widespread poaching reduced wild African elephant herds from 1.2 million to about 600,000. The ban succeeded in stopping the precipitous population decline. However, renewed poaching and illegal trade have taken a toll on elephant populations. In 1997, CITES allowed Zimbabwe, Botswana and Namibia to sell, as a one-time experiment, almost 50 metric tons of ivory to Japan. Subsequently, some countries noted an increase in poaching and illegal trade. Between 1 January 2000 and 21 May 2002, a minimum of 11.9 tons of ivory, 2542 tusks, and 14,648 pieces of ivory were seized worldwide, representing over two thousand dead elephants. During. the same period of time, a minimum of 965 African elephants and 39 Asian elephants were poached. Clearly, more control over elephant poaching and illegal ivory trade is needed instead of a renewal of the legal ivory trade. That is why Kenya and India have submitted a proposal, to be considered at the upcoming CITES meeting, to stop all international commercial trade in elephants and their parts and products. In contrast, five southern African countries (Zimbabwe, South Africa, Namibia, Zambia and Botswana) have proposed that CITES allow them to sell 87 metric tons of elephant ivory in the international marketplace—the tusks of approximately 11 thousand dead elephants. Four of these countries have also asked to be allowed to sell an additional 13,000 metric tons of ivory in the international marketplace each year. Finally, two of these countries have also asked to trade in ivory for non-commercial purposes, such as ivory souvenirs.

It is important that the United States, which has led opposition to the international ivory trade since 1989, oppose the proposals of Zimbabwe, South Africa, Namibia, Zambia and Botswana to sell ivory in the international marketplace and

support the proposal of Kenya and India to halt elephant trade. A return to a legalized international ivory trade would spell doom for elephants.

Specially Protected Areas and Wildlife (SPAW)

The SPAW protocol protects ecosystems, habitats, and endangered and threatened species residing in the Wider Caribbean region. SPAW is an international Agreement which paves the way for the greater coordination and protection of animals and their habitat. It is of deep concern that the United States has not ratified the Agreement. SPAW was adopted in 1990 and came into force in 2000, and though the United States has signed the Protocol, it has not ratified. The United States must ratify the Protocol and participate in its evolution to ensure that it offers the highest possible protection for animals and their habitats.

Convention on Migratory Species of Wild Animals (CMS)

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or the Bonn Convention) aims to conserve terrestrial, marine and avian migratory species throughout their range. It is a small number of intergovernmental treaties concerned with the conservation of wildlife and wildlife habitats on a global scale. Since the Convention's entry into force in November 1983, its membership has grown steadily to include 80 Parties from Africa, Central and South America, Asia, Europe and Oceania. Parties to CMS work together to conserve migratory species and their habitats by providing strict protection for the endangered migratory species listed in Appendix I of the Convention; by concluding multilateral Agreements for the conservation and management of migratory species listed in Appendix II; and by undertaking co-operative research activities.

There is great potential for cooperative international conservation in the CMS. However, the problem is that the United States is not a member. There is much work that needs to be done to protect migratory species and unless the United States ratifies the CMS this country will be missing out on—a valuable opportunity to fully utilize this Agreement to protect such a wide range of species.

Trade and the Environment

United States leadership in international trade and economic issues as they relate to animal welfare and the environment is essential. Unquestionably, these issues are intertwined with international trade and economic issues. The World Trade Organization (WTO) is in the midst of negotiations concerning the overlap between multilateral environmental agreements and international trade rules. These negotiations are important and must be given the necessary attention and resources to ensure a successful outcome. Members of the WTO are also engaged in serious negotiations concerning agricultural reform and increased market access for agricultural products. In the context of these negotiations the European Union proposed that animal welfare be addressed. I understand that the United States has yet to give its full support to this proposal. I strongly urge Members of Congress to engage the Administration on this issue and work toward the shared goal of including animal welfare in the agricultural negotiations.

STATEMENT OF JOHN C. DEHRNBACH, PROFESSOR OF LAW, WIDENER UNIVERSITY

Committee Chairmen Jeffords and Biden, Subcommittee Chairman Sarbanes, and members of the Committees: good morning. Thank you for the opportunity to discuss U.S. adherence to its sustainable development commitments, particularly those made at the Earth Summit in Rio de Janeiro in 1992.

I am the editor of a 32-chapter book on U.S. sustainable development efforts in the 10 years since the Earth Summit, entitled Stumbling Toward Sustainability. The book is being published this week by the Environmental Law Institute. The book's 42 contributors come from universities and law schools, nongovernmental organizations, the private sector, and State government. They are respected experts in their fields.

A list of chapters and authors is attached to this statement. The book's synthesis, which pulls together the major themes of the book and summarizes each of the chapters, is also attached.

Ten-Year Assessment: U.S. Made Little Progress

The U.S. has unquestionably begun to take some steps toward sustainable development, largely because of our environmental and conservation laws. Yet, on balance, the United States is now far from being a sustainable society, and in many respects is farther away than it was at the time of the Earth Summit in 1992. Unlike many other developed countries, the United States has not used a strategic

process to move the country toward a sustainable future and has not educated the American people about the opportunities and challenges of sustainable development.

With 5 percent of the world's population, the United States was at the time of the Earth Summit responsible for about 24 percent of the world's energy consumption and almost 30 percent of the world's raw materials consumption. Since the Earth Summit, materials use has increased 10 percent, primary energy consumption has increased 21 percent, and energy-related carbon dioxide emissions have increased by 13 percent. Over and over, increases in materials and energy efficiency, and in the effectiveness of pollution controls for individual sources, were outweighed by increases in consumption. Despite a significant increase in municipal waste recycling in the past decade, for example, the U.S. generation and disposal of municipal solid waste per capita have been growing since 1996. According to Harvard biologist Edward O. Wilson, "four more planet Earths" would be needed for "every person in the world to reach present U.S. levels of consumption with existing technology." Yet the U.S. standard of living-equated with high levels of consumption and "the good life"—is widely envied and emulated throughout the world.

The United States has not exercised the kind of international leadership necessary to encourage or support sustainable development around the world. U.S. law and policy continue to encourage unsustainable development in a variety of ways, including subsidies and fragmented local decisionmaking that encourages sprawl. As a whole, the condition of America's natural resources and ecosystems has not improved, and appears to have deteriorated slightly, over the past decade. Our infrastructure and social support systems continue to cause environmental degradation and underserve the poor.

National Sustainable Development Strategy is Needed

The Federal Government should adopt and implement a national strategy for sustainable development, with specified goals and priorities, to harness all sectors of society to achieve our economic, social, environmental, and security goals. The strategy would lead to a stronger, more prosperous America with higher quality of life because we would be pursuing these goals in ways that support each other in greater and greater degrees over time, rather than undermining each other. The strategy could be modeled on that of the European Union or States such as Oregon and New Jersey, and specifically address climate change, biodiversity, international trade, and other major issues.

The President could get the process started with an appropriate executive order to Federal agencies under the Government Performance and Results Act and the National Environmental Policy Act. An executive-level entity would be needed to coordinate and assist in the implementation of the strategy. A counterpart entity in Congress would also be helpful. A set of indicators to measure progress in achieving goals would make the strategy more effective and meaningful.

In addition, the U.S. needs to recognize that its substantial consumption levels, coupled with domestic population growth, have serious environmental, social, and economic impacts. Americans also need to understand that human well-being can be maintained and enhanced by more efficient and effective use of materials and energy. A shift in taxes from labor and income, on one hand, to materials and energy consumption, on the other, would encourage both greater efficiency and reduced negative environmental impacts. A variety of other legal and policy tools that have successfully been used at the State level to reduce environmental effects of consumption and for other purposes are also available, including renewable energy portfolio standards and smart growth legislation.

The U.S. needs to take a stronger and more constructive leadership role internationally, not only on terrorism but on the broad range of issues related to sustainable development. Congress should repeal or modify laws, policies, and subsidies that encourage unsustainable development. Protection of natural resources and the environment must focus more holistically on the resources to be protected, and on understanding those resources. Transportation, public health, and other social infrastructure and institutions should be designed and operated to further economic, environmental, and social goals at the same time.

In virtually every area of American life, a few people and organizations are exercising leadership for sustainability. The United States would take a large and decisive step toward sustainability if individuals, businesses, educational institutions, local and State governments, Federal agencies and others would simply adopt and build on the leading sustainability practices of their counterparts. A properly conceived and implemented strategy would lead to that result.

These and other recommendations are set out in detail in the book. They provide an issue-by-issue roadmap for sustainability in the United States.

Toward a Brighter Future for Our Children and Grandchildren

We now face growing environmental degradation around the world and a growing gap between rich and poor. These are related problems, and they hinder or undermine everything else we care about—security, economic development, social well-being, and even effective governance. Put differently, poverty and environmental degradation are deeply destabilizing because they stifle or reduce opportunities and quality of life for many, many people.

In the next 50 years, global population is projected to increase by three billion people, and the global economy is likely to grow by four or five times. As difficult as things now are, environmental degradation and the gap between rich and poor are likely to get much worse if continue business as usual. Should that be our legacy for our children and grandchildren?

We know what we need to do to move toward sustainability, and we also know why. As Americans, we are called to face these challenges, and to seize this opportunity.

ATTACHMENT 1

(Environmental Law Institute 2002)

STUMBLING TOWARD SUSTAINABILITY

(John C. Dernbach, Editor)

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Thomas E. Graedel, Clifton R. Musser Professor of Industrial Ecology and Director, Center for Industrial Ecology, School of Forestry and Environmental Studies, Yale University

3. Production and Consumption of Energy

Lynn Price, Deputy Group Leader, International Energy Studies Group, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory

Mark D. Levine, Division Director, Environmental Energy Technologies Division, Lawrence Berkeley National Laboratory

4. Population

Anne H. Ehrlich, Policy Coordinator, Center for Conservation Biology, Stanford University

James Salzman, Professor of Law, American University, Washington College of Law

III. International Trade, Finance, and Development Assistance

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Sanford E. Gaines, Professor of Law, University of Houston Law Center

6. Official Development Assistance

Royal C. Gardner, Professor of Law and Director of Graduate and International Studies, Stetson University College of Law

7. Development Assistance and Poverty

James Gustave Speth, Dean and Professor of Environmental Policy and Sustainable Development, School of Forestry and Environmental Studies, Yale University

8. Private Finance

Frances Seymour, Director, Institutions and Governance Program, World Resources Institute

Lisa Dreier, Graduate Student, University of California, Berkeley

Lily Donge, Social Research Analyst, Calvert Asset Management Company

IV. Conservation and Management of Natural Resources

9. Fresh Water

Robert W. Adler, Professor of Law, Wallace Stegner Center for Law, Resources and the Environment, University of Utah College of Law

10. Oceans and Estuaries

Robin Kundis Craig, Associate Professor of Law, Indiana University School of Law

11. Air Pollution
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John A. Pendergrass, Staff Attorney, Environmental Law Institute
32. National Governance

John C. Dernbach, Professor of Law, Widener University

STATEMENT OF CHRISTOPHER C. HORNER, SENIOR FELLOW, COMPETITIVE ENTERPRISE INSTITUTE

Mr. Chairman, I appreciate the opportunity to testify before this joint panel on a topic of great importance. The scope of today's hearing is broad, so I focus my testimony upon the propriety of the U.S. agreeing to amend the U.N. Framework Convention on Climate Change (UNFCC, or Rio Treaty), by ratifying the Kyoto Protocol.

For whatever specific reasons (economic growth, failure to foresee the energy requirements of the "new economy", or other), the U.S., like many nations, failed to meet its voluntary Rio targets.

Now some advocates assert, "Because the U.S. has not met its Rio goal, we must commit to even greater mandatory reductions (Kyoto)". Attempting instead to comply with the initial treaty seems the more appropriate response, for several reasons.

Rio went into force in March 1994. President Clinton did not request, nor did Congress enact, independent legislation implementing Rio, which was not an inherently self-executing treaty. Authority and precedent make clear that responsibility for proposing such programs lies with the White House. If our "non-binding" Rio obligations in fact "bound" the U.S. to achieve specific reductions—contrary to contemporary Senate and Executive assertions of U.S. intent—then the Executive interpretation of Rio Article 4 throughout the 1990's was actually incorrect, and is responsible. The pending question is apparently: does the U.S. respond by attempting to meet such Rio promises, or by making further, even deeper, binding promises?

Skipping specific pursuit of the U.S.' Rio promises, in favor of Kyoto's binding commitments even greater than those we've failed to attain, seems highly illogical. Compounding this of course is that, precisely 5 years ago tomorrow, the Senate unanimously spoke to what it recognized was an unacceptable drift away from the U.S. Rio stance adamantly opposed to binding commitments. The Senate, seeing what was developing, asserted its "Advice" pursuant to Article II, Section 2 of the U.S. Constitution, passing S. Res. 98.

Subsequent to and despite this Advice, U.S. negotiators clearly disregarded both major Byrd-Hagel recommendations: Kyoto did not require developing countries to share our commitments, and even the Clinton White House economic advisors have recanted their refutations of the Kyoto cost estimates.

Since then, nothing has emerged to indicate that Kyoto does not still violate both key Byrd-Hagel conditions, and it is likely that very few Senators have amended their position against a treaty causing "serious economic harm." However, Clinton Administration officials did admit that they began working on the plan for binding commitments within 1 year after Rio went into effect.

Kyoto, too, is clearly intended to be a similar step in a "treaty hopping" campaign: even the models on which it is based predict an undetectable climatic impact—at a cost to the U.S. of up to $400 billion annually—but instead may be 1/30th of what its proponents seek. Rio and Kyoto offer differing commitments but purport "the same ultimate objective." The U.N. IPCC has said this means reducing GHG emissions by as much as 60–80 percent, which wildly exceeds Kyoto's specified ambitions.

As such the U.S. should require, prior to and as part of ratifying any further agreements, express acknowledgement not only of the actual "ultimate goal", but that it is committed to its practical requirements, in this case up to "30 Kyotos".

Such "treaty hopping" agendas illustrate the importance of Senate treaty "reservations", or the Senate's second bite at the "Advice" apple. This comes of course during the "Consent" function, which function the U.S. negotiators unfortunately eviscerated. After agreeing to terms incompatible with Byrd-Hagel, the Administration also accepted Kyoto's prohibition on reservations, or the Senate's ability to specify the specific understandings or conditions of the U.S. commitment. This despite the Senate also having forewarned the administration about this in advance of Kyoto.

In summation, President Bush ought to match his assertions of having "rejected" Kyoto with the requisite submission to the U.N. to that effect, as was done regarding the International Criminal Court. In the absence of that act, the White House must at minimum assist resolution of the ambiguous U.S. role in Kyoto by requesting the Senate disapprove of the treaty. In the absence of that, the Senate should recognize that there is no reverse equivalent of the "presentment" clause, regarding treaties. Only protocol, not any constitutional prohibition, impedes Senate consideration of a signed treaty. Certainly given the imperative rhetoric surrounding Kyoto,

if President Bush insists on continuing the U.S.' ambiguous role the Senate should take matters into its own hands, and decide the fate of this agreement.

That resolution should by definition be rejection of Kyoto. Otherwise, by accepting this double indignity of ignoring advice and prohibiting reservations, this body would condone Executive circumvention of the Senate's constitutional treaty role.

As part of my testimony for the record, I include an article I have prepared for the Federalist Society, though still in draft form, addressing relevant issues surrounding the propriety of ratifying Kyoto, and recommending courses for withdrawal or otherwise pursuing clarification of the U.S.' ambiguous treaty status. Thank you again for the opportunity to appear.

In Rio in 1992 the U.S. made, and the Senate unanimously ratified, various commitments regarding reducing greenhouse gas (GHG) emissions, both thematic and with a specific emission target (1990 levels).

See, e.g., http://unfccc.int/resource/docs/natc/eunc3.pdf. The EU, which under Kyoto has negotiated a "bubble" such that it could pool its increases and "reductions", announced in May that it met its Rio target. It said it had reduced greenhouse gases by 3.5 percent below 1990 levels in 2000. This is commonly attributed to the ending of coal subsidies in Great Britain in their push to replace coal with gas, shutting down East German industry and that Europe did not match the U.S.' decade-long economic expansion. Russia, e.g., met its target by regressing economically.

As the party charged with "making" treaties the Executive is responsible for meeting, or at minimum proposing legislation to affect, treaty commitments. President Clinton proposed a Btu tax, though not expressly in pursuit of Rio. It failed once and did not emerge again. He instituted his Climate Action Plan, which with minor recent modifications continues to this day with more than 50 voluntary programs, though a quick search of Thomas revealed no implementing legislation. Congress did appropriate money in response to proposals by the Executive. See, e.g., "Treaties and Other International Agreements: The Role of the U.S. Senate", S. Rpt. 106–71, p.4.

"Implementation The executive branch has the primary responsibility for carrying out treaties and ascertaining that other parties fulfill their obligations after treaties and other international agreements enter into force, but the Senate or the entire Congress share in the following phases." "Treaties and Other International Agreements", p. 12. "A question that may be raised under U.S. law is whether or not Congress has a duty to implement a treaty which is in force internationally, but which requires additional legislation or implementation or an appropriation of funds to give effect to obligations assumed internationally by the United States. When implementation of a treaty requires domestic legislation or an appropriation of funds, only the Congress can provide them." Id. at pp. 166–67.

The FRC Report continues, "The extent of congressional obligation to implement a treaty under U.S. law has not been resolved in principle. FN 61 According to an often-cited authority, Congress has generally responded to a sense of duty to carry out what the treaty-makers promised, to a reluctance to defy and confront the President (especially after he can no longer retreat), to an unwillingness to make the U.S. system appear undependable, even ludicrous . . ." Id. at 167, quoting Henkin, Louis. Foreign Affairs and the United States Constitution. 2d ed. 1996, pp. 205–206. The referenced FN 61 says in pertinent part, "[F]ailure to implement an internationally perfected treaty would constitute a violation of obligations assumed by the United States under international law. See Memorandum of April 12, 1976, by Monroe Leigh, Legal Adviser, Department of State, as quoted in U.S. Department of State. Digest of U.S. Practice in International Law 1976. 1977, p. 221." This begs the question: "to precisely what extent was the "non-binding" Rio binding?

Addressing the question, above (FN 5), prior to ratification, "[t]he [Senate Foreign Relations] Committee made clear, in other words, its view that "[t]he final framework convention contains no legally binding commitments to reduce greenhouse gas emissions . . ." While these statements may not be as legally binding as a formal condition to the Senate's ratification of the 1992 Convention [ed: reservations were prohibited by Rio's terms], it is doubtful that any administration could ignore them." "Global Climate Change: Selected Legal Questions about the Kyoto Protocol", p. 4. CRS Report for Congress (March 29, 2001), citing in part 138 CONG. REC. 33521 (Oct. 7, 1992)(statement of Sen. McConnell).

To avoid future such uncertainty, in S.Res. 98 (105th Cong., 1st Sess., adopted at 143 CONG. REC.S. 8138 (daily ed. July 25, 1997)), the Senate "stated the view that any agreement which would require Senate advice and consent should be accompanied by a detailed analysis of its economic impact and of any legislation and regulations necessary to implement the agreement." See CRS Report at p. 6, FN 25.

"In mid–1997, as these negotiations were underway, the Senate passed S. Res. 98 [ed.: "Byrd-Hagel," S.Res. 98 105th Congress (105–54 July 21, 1997)], which stated that the Senate would not approve any agreement on binding reductions in greenhouse gases that did not include commitments by developing countries as well as developed/industrialized countries, or that would result in harm to the U.S. economy. The administration has not transmitted the Kyoto Protocol to the Senate because, among other reasons, developing countries have to date not been willing to consider making binding commitments regarding their greenhouse gas emissions." "Treaties and Other International Agreements", p. 276.

The operative language is as follows: "Resolved, That it is the sense of the Senate that—

(1) the United States should not be a signatory to any protocol to, or other agreement regarding, the United Nations Framework Convention on Climate Change of 1992, at negotiations in Kyoto in December 1997, or thereafter, which would—

(A) mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period, or

(B) would result in serious harm to the economy of the United States".

"Economists from the Clinton White House now concede that complying with Kyoto's mandatory reductions in greenhouse gases would be difficult—and more expensive to American consumers than they thought when they were in charge." USA Today, 12 June 2001.

In 1996, Deputy Assistant Secretary of State Rafe Pomerance asserted that "the administration has been working on this policy for more than a year", quoted in Nature, 25 July 1996.

See, Testimony of Dr. Sallie Baliunas to the Senate Committee on Environment and Public Works, at http://www.techcentralstation.com/1051/envirowrapper.jsp?PID=1051–450&CID=1051–031302C.

U.S. Department of Energy, Energy Information Administration, Office of Integrated Analysis and Forecasting. "Impacts of the Kyoto Protocol on U.S. Energy markets and Economic Activity." Washington, DC. October 1998.

"Yet the climate simulations lead to the conclusion that the Kyoto reductions will have little effect in the twenty-first century (15), and '30 Kyotos' may be needed to reduce warming to an acceptable level." James Hansen, Makiko Sato, Reto Ruedy, Andrew Lacis, and Valdar Oinas, "Global warming in the twenty-first century: An alternative scenario," Proceeding of the National Academy of Sciences, August 29, 2000.

Hansen was citing Malakoff, D. (1997) Science 278, 2048.

"[S]tabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." See, e.g., Rio Article 2.

See "Treaties and Other International Agreements," at 274.

The President manifested that this is how the United States makes "its intention clear to not become a party to the treaty," as required by "customary" law and the Vienna Convention Article 18. "[S]ignature by the U.S. does impose an obligation on the U.S. under international law to refrain from actions that would undermine the Protocol's object and purpose. That obligation continues to apply until such time as the U.S. ratifies the Protocol or makes clear its intent not to do so." "Global Climate Change: Selected Legal Questions about the Kyoto Protocol", CRS Report for Congress (March 29, 2001).

Though it has not yet done so, precedent indicates the Senate can also effect this outcome by passing a Sense of the Senate expressing disapproval of a signed, not ratified treaty. See, "Withdrawal," in attached article.

[Prepared for the Federalist Society July 2002]

MODERN DEVELOPMENTS IN THE TREATY PROCESS

RECENT DEVELOPMENTS REGARDING ADVICE AND CONSENT, WITHDRAWAL, AND THE GROWING ROLE OF NONGOVERNMENTAL ORGANIZATIONS IN INTERNATIONAL AGREEMENTS WITH PARTICULAR EXAMINATION OF THE 1997 KYOTO PROTOCOL

(By Christopher C. Horner, Esq., Senior Fellow, Competitive Enterprise Institute; Tyler Dunman, Research Assistant]

INTRODUCTION TO THE TREATY PROCESS[1]

Treaties are agreements between nations, or States. They range from bilateral agreements to multilateral pacts including each of the 189 member states of the United Nations. Throughout history treaties have addressed all manner of international discourse, from rules of military engagement to mutual defense and termination of hostilities, creating a U.N. and a European Union, international border delineation, liability in international transportation, establishing trade terms and intellectual property protections.[2]

As such treaties, or "conventions" with amendments thereto called "rounds", protocols, etc. which are typically discrete treaty agreements requiring independent ratification, are the manner by which states formalize codes for their relationships, both civil and criminal.[3] Depending on their nature treaties are therefore properly viewed either as contracts, in that they establish civil procedures, or as establishing the equivalent of laws applicable to the parties.[4]

In modern practice states have increasingly turned to treaties to address matters not clearly involving international discourse such as trade or conduct on the high seas but establishing norms of purely domestic behavior. States, which under the Constitution have no treaty power,[5] have nonetheless waded into areas which are the subject of modern treaties, negotiating international agreements addressing topics such as the theory of "man-made global warming".[6]

The 1997 Kyoto Protocol, also addressing that theory of man-made global warming is exemplar of efforts addressing (principally) domestic activities.[7] It does claim a purported global phenomenon as its basis and the bulk of the world's recognized states as parties, but selectively commits certain developed nations to reduce domestic energy use emissions. Given current technology, for the foreseeable future Kyoto thereby effectively rations and redistributes particular domestic economic activity by instituting this selective cap, in perpetuity and not indexed for economic or population growth. As such, Kyoto is arguably in truth an economic instrument by which foreign competitors hope to mitigate U.S. competitive advantages.[8]

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[1] This paper attempts to clarify common misunderstandings about the treaty process, particularly as involve the United States and ambiguities arising from inconsistent treatment of various treaty commitments. Certain assertions made herein, for example regarding the history of Kyoto and specifically certain negotiating developments, are not formally documented but based upon the author's observations attending these negotiations, both as an attorney representing a nongovernmental organization, and writing on the proceedings for various publications.

[2] See various definitions, FN 53, infra. Treaty topics even range to taxation of foreign motor vehicles and unification of road signals. For the compendium of "[e]very treaty and every international agreement entered into by any Member of the United Nations", see http://untreaty.un.org/. For a selection of treaties signed, though not necessarily ratified by the United States, see http://usinfo.state.gov/usa/infousa/laws/ tradeagr.htm.

[3] The latter actually involves sanction by a supranational body of private entities and individuals acting on behalf of a state. For such matters agreements have created ad hoc bodies, for example the International Criminal Tribunal for the former Yugoslavia (see http://www.un.org/icty/index.html), and the International Criminal Tribunal for Rwanda (see http://www.ictr.org/), both under auspices of the U.N. Security Council.

[4] For a compendium of treaties addressing "Penal Matters," see http://untreaty.un.org/ENGLISH/bible/ englishinternetbible/partI/chapterXVIII/chapterXVIII.asp.

[5] U.S. Constitution, Article 1, Section 10: "No State shall enter into any Treaty, Alliance or Confederation . . . No State shall, without the Consent of Congress . . . enter into any Agreement or Compact with another State, or with a foreign Power . . ."

[6] For discussion of a recent example, see "New England Governors Pledge to Implement Kyoto, Violate Constitution", Jon Reisman, Downeast, Coastal Press, July 16, 2002. Reisman is an associate professor of economics and public policy at the University of Maine at Machias.

[7] Kyoto also imputes emissions to covered states from activities in international airspace and waters, even national security and international peacekeeping missions despite an initial U.S. effort to exclude the latter.

[8] "This is about international relations, this is about economy about trying to create a level playing field for big businesses throughout the world. You have to understand what is at stake

Continued

Cornell University Professor of Law Jeremy Rabkin writes:

"In 1929 Chief Justice Hughes of the U.S. Supreme Court—who had already served as a justice on the Permanent Court of International Justice—reaffirmed the doctrine that the treaty power cannot be invoked as a mere pretext for altering domestic policies:

"[T]he treaty making power was intended for the purpose of having treaties made relating to foreign affairs and not to make laws for the people of the United States in their internal concerns through the exercise of the asserted treaty-making power.[9]

Nonetheless, agreements such as Kyoto now proliferate. In this context, it seems fair to paraphrase Clausewitz on war: treaties are the extension of politics by organized state lobbying.

Treaties purporting to involve binding commitments are enforceable against parties to the agreement.[10] Disputes over compliance or implementation of the bulk of treaties, best characterized as civil agreements, are heard before the International Court of Justice.[11] "The Court has two functions: to render judgments on disputes submitted to it by States and to furnish advisory opinions on questions referred to it by authorized bodies."[12]

Originally, the Framers conceived of treaties not as the creation of laws, but more contracts between states bearing the force of law.[13] Time and intervening "criminal" agreements, of course, have further clouded this assessment.

A body of international common or "customary" law evolved to assist in treaty interpretation. This body of law was purportedly codified by the 1969 Vienna Convention on the Law of Treaties.[14] In the pursuit of enforcing such agreements, canons of statutory and contractual construction recognized domestically by an individual state may offer insight and even guidance as to what a party intended, but do not strictly apply.[15]

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and that is why it is serious." European Union Commissioner for the Environment Margot Wallstrom, quoted by The Independent (London), March 19, 2002, p. 14.

[9] Rabkin, "Why Sovereignty Matters," (1998 AEI Press), p. 22, citing Proceedings of the American Society of International Law, vol. 23 (1929), pp. 194–6.

[10] Not all treaties purport binding commitments. The parent agreement of the principal case study cited herein (Kyoto), is the United Nations Framework Convention on Climate Change (UNFCCC). The UNFCCC was typical of treaties merely expressing mutual goals, or "promises" of voluntary undertakings (in this case, voluntary commitments to attempt to reduce man-made "greenhouse gases", or GHGs).

[11] "The Court, in existence since 1946, serves as the successor to the Permanent Court of International Justice established by the League of Nations and derives its mandate from a Statute which forms an integral part of the Charter of the United Nations." http://www.un.org/Depts/dhl/resguide/specil.htm#icj. For text, see http://www.un.org/Overview/Charter/contents.html.

[12] Id. The Permanent International Court of Justice was established with the chartering of the United Nations (http://www.un.org/aboutun/charter/). The United States withdrew its August 1946 accession to this court in October 1985 in response to an unfavorable verdict in an action brought against it by Nicaragua. For the text of the declaration see United Nations, Treaty Series, vol. l, p. 9. That does not resolve the matter but actually leaves the U.S. status regarding this treaty as rather ambiguous, also. The implications of this move, regarding proper venue for pursuit of actions by (or against) the United States is a topic more appropriate for a separate paper.

Recently, sufficient signatory nations submitted ratification instruments of the Rome Treaty to bring into effect a permanent International Criminal Court (ICC)(http://www.un.org/law/icc/statute/romefra.htm), and questions persist over the potential application of its terms not merely against ratifying nations but others—specifically the U.S.—whose, e.g., troops assigned to U.N. peacekeeping duty may be deemed by parties to Rome to have transgressed to the detriment of ratifying nations. The United States signed the Rome Treaty, but rescinded its signature, as detailed, infra.

For the panoply of international legal bodies see http://www.un.org/Depts/dhl/resguide/specil.htm.

[13] Still, this apparent view of a discipline not properly in the exclusive realm of the executive or legislative realm was a factor in bifurcating the roles in treaty accession. See esp. Hamilton in Federalist No. 75.

[14] "The United States views most of the Vienna Convention as codifying customary international law."

"Global Climate Change: Selected Legal Questions about the Kyoto Protocol", p. 3, FN 9. CRS Report for Congress (March 29, 2001). See also, e.g., http://www.law.cornell.edu/topics/international.html. For text, see United Nations, Treaty Series, vol. 1155, p. 331. See FN 76 infra for a discussion regarding who accedes to Vienna's terms. See also http://untreaty.un.org/ENGLISH/bible/englishinternetbible/partI/ chapterXXIII/treaty1.asp, for signatories and ratifications, reservations, and related details.

[15] Vienna Articles 31 and 32 open the door for such considerations.

Individual agreements obtain their popular name, typically, from the site of some meaningful level of agreement, e.g., Ghent, Vienna, Rome, Kyoto.[16] Occasionally a treaty is popularly characterized by its formal name, e.g., the General Agreement on Tariffs and Trade (or GATT, agreed to in 1947, subsequently the subject of further rounds, e.g., its 8-year "Uruguay Round," etc.).

The agreed-to language emerging from organic treaty negotiations can, though does not universally, rise to the level of an enforceable treaty. That is, it can but does not always include sufficient detail to make it a "meeting of the minds". Even treaties open for ratification are not necessarily completed to the point of offering sufficient detail for coherent, uniform understanding and compliance. Indeed, states have ratified treaties including Kyoto despite numerous negotiations remaining to define what was actually agreed. The obvious problems associated with this phenomenon are discussed briefly, in "Ratification", infra. Regardless of whether the treaty terms declare the document open for ratification, such language is occasionally merely a starting point, or near thereto.[17]

The initial level of agreement is typically manifested by publication of the terms agreed, and listing the agreeing parties.[18] This is an at best a symbolic practice. That is, a state not "agreeing" to a document at its inception does not impede it from subsequently following the treaty's terms toward accession. Indeed, numerous countries not even signing, for example the Kyoto Protocol, ratified it nonetheless.[19] It is theoretically possible, though not in the case of the United States, for a treaty

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[16] For a listing of such popular names, see http://untreaty.un.org/English/sample/SimpleSample.asp.

[17] For a roadmap of how the U.N. Office of Legal Affairs, Treaty Section, views the various stages of the treaty process, see http://untreaty.un.org/English/TreatyHandbook/hbframeset.htm. Specifically, see Kyoto, http://usinfo.state.gov/usa/infousa/laws/treaties/l07a01.pdf), the basic treaty structure agreed to at the "Third Conference of the Parties" to the UNFCCC, or COP–3, the details of which were to be worked out at subsequent COPs. Since Kyoto, five COPs have taken place with another scheduled for October 2002, narrowing the treaty's broad assertions each time (with one exception; see discussion November 2000 Hague discussions in "Ratification", infra). The treaty was open for signature between March 1998 and March 1999. Kyoto has been open for ratification since March 1999. It goes into effect when ratification instruments are submitted by covered, or "Annex I" countries (of which there are 36), representing 55 percent of 1990 GHG emissions.

By the end of July 2002, 75 countries had submitted ratification instruments representing 35.8 percent of the covered 1990 GHG emissions, despite the necessity of negotiations to craft a document with sufficient detail to be enforceable. 55 of the 75 ratifying states are among the 140 states bearing no emission reduction obligations (whose tanks include large industrial players China, Mexico, Brazil, India, South Korea, Indonesia). This does leave Kyoto 19.2 percent shy of the 55 percent threshold to come into force, leaving solely Russia (17.4 percent) or the United States (36.1 percent) as determinative of Kyoto's fate.

It is logical that countries with actual obligations proceed more deliberately given the undefined terms threaten real impact on them. Further, with treaty effectiveness at hand, recent COP negotiations indicate that remaining covered non-ratifying signatories are driving hard bargains to minimize the initial economic harm—or maximize initial economic gain, as the case may be. For example, due to its unique circumstances Russia stands to make quite a large sum from Kyoto. Upon becoming indispensable to Kyoto's fate, Russia secured larger allowances for sale of valuable "sinks" (see FN112, infra), and recently added debt forgiveness to their list of requirements in return for their determinative ratification.

[18] See Decision1/CP.3 of the Conference of the State Parties to the Convention at its third session (UNEP, UNFCCC). The U.S. State Department asserts that it agreed to Kyoto ("Treaty Actions" page). "Environment—Climate Change Amendments to Annex I of the Framework Convention on Climate Change of May 9, 1992. Adopted at Kyoto Dec. 11, 1997. Entered into force Aug. 13, 1998. (http://www.state.gov/www/global/legal—affairs/treaty—actions.html).

The Vienna Convention speaks to the process issue in Article 9, "Adoption of the text":

"1. The adoption of the text of a treaty takes place by the consent of all the States participating in its drawing up except as provided in paragraph 2.

2. The adoption of the text of a treaty at an international conference takes place by the vote of two-thirds of the States present and voting, unless by the same majority they shall decide to apply a different rule."

[19] "Parties that have not yet signed the Kyoto Protocol may accede to it at any time." http://unfccc.int/ resource/convkp.html#kp. For examples of non-signatory ratifications, see http://untreaty.un.org/. Curiously, however, in response to a June 2002 inquiry by the author as to the U.S. status under Kyoto given the ambiguity between President Bush's verbal "rejection" and the absence of a withdrawal, the Secretary General of the UNFCCC asserted the following: "Simple signature does not affect entry into force which depends entirely on ratifications/accessions. Signature qualifies the signatory State to proceed to ratification, acceptance or approval." This belies that several nations ratified Kyoto without signing the document. Further, the author's follow-up request as to whether this indicates the UNFCCC does not recognize the Vienna Convention has gone unanswered to date.

to impose legally enforceable obligations at the "agreement" stage, given that some states' constitution permits such commitment by executive signature alone.[20]

The U.S. Constitution is more typical in that it requires a level of legislative concurrence with an executive treaty commitment for the treaty to be binding.[21] The U.S. Constitution requires Senate "advice and consent" to any treaty prior to it coming into effect against the U.S., both the language and application of which having created tensions between our Constitution and international law. Treaty commitments inherently cede some level of sovereignty by transferring accountability to a supranational authority without the safeguards of our system, developing binding policy without the U.S. Constitution's checks and balances.[22] Therefore these agreements, the permissibility of which was authorized by the Constitution, also inherently create tensions with its framework.[23]

Treaty negotiations formally involve only participant states, although in multilateral negotiations a (not quite) quasi-formal role exists for interested—and U.N. approved—third parties. These nongovernmental organizations, or NGO's, if approved obtain credentials and participate in the summits in an informal capacity.[24] They are provided access to negotiators, attendance in plenary and subsidiary body sessions, and briefings denied the public but have no voting or formal negotiating role. NGO's are, in short, lobbying organizations. The UN's system is akin to a more controlled (i.e., subjectively selective) version of the pre-1995 U.S. Congressional practice of issuing special passes allowing special access.[25]

There are four necessary stages prior to a treaty taking binding effect against the United States. This is typical of most systems, with minor exceptions. These stages

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[20] See Vienna Article 12, "Consent to be bound by a treaty expressed by signature":

"1. The consent of a State to be bound by a treaty is expressed by the signature of its representative when:

(a) the treaty provides that signature shall have that effect;

(b) it is otherwise established that the negotiating States were agreed that signature should have that effect; or

(c) the intention of the State to give that effect to the signature appears from the full powers of its representative or was expressed during the negotiation."

[21] U.S. Constitution, Article II, Section 2. Vienna acknowledges such requirements, recognizing exchange of instruments, ratification (also called acceptance or approval), accession, and deposit of instruments. See Vienna Articles 13, 14, 15 and 16 respectively.

[22] For example, "the current version of [the North American Free Trade Agreement (NAFTA)] allows private litigants to challenge certain U.S. trade measures before a supranational panel, the decisions of which cannot be reviewed but must still be enforced by U.S. domestic courts." Rabkin at 4, citing NAFTA reprinted in 32 I.L.M. 289 (1993) Art. 1904. Further, "the U.S.-Canada Free Trade Agreement and its successor, NAFTA, already provide for appeals by private parties from U.S. administrative proceedings to supranational tribunals". Rabkin at 18. This latter reality clearly conflicts with Article III, Section 2, Clause 1: "The judicial Power shall extend to all Cases, in Law and Equity, arising under this Constitution, the Laws of the Untied States, and Treaties made, or which shall be made, under their Authority".

Modern legal scholarship on the treaty power is thus reasonably analogized to the shift of authority away from states to the Federal Government that began with the New Deal in the 1930's. See Rabkin for a discussion of the comparison of diminution of constitutional limits on Federal power, and the treaty power.

[23] For example, the Constitution not only recognized "a law of nations" (in granting Congress the power to remedy offenses against same, Article I Section 8). The Framers provided treaties parity with the "supreme law of the land" (Article VI), or Federal statutes, despite that treaty bodies to which the U.S. accedes clearly may assume authorities and create rules in conflict with domestic law (not to mention the Constitution)(see Jay in Federalist No. 64).

Vienna Article 27 offers the provocative assertion: "Internal law and observance of treaties: A party may not invoke the provisions of its internal law as justification for its failure to perform a treaty. This rule is without prejudice to article 46." The latter provision tempers the friction somewhat, enabling a U.S. constitutional defense: " Invalidity of Treaties, Article 46, Provisions of internal law regarding competence to conclude treaties:

1. A State may not invoke the fact that its consent to be bound by a treaty has been expressed in violation of a provision of its internal law regarding competence to conclude treaties as invalidating its consent unless that violation was manifest and concerned a rule of its internal law of fundamental importance.

2. A violation is manifest if it would be objectively evident to any State conducting itself in the matter in accordance with normal practice and in good faith."

This paper does not explore such tensions and what areas treaties may permissibly seek to resolve, instead restricting its discussion to the treaty process. For a detailed discussion on this and limitations on the treaty power, see Rabkin.

[24] Controversy has arisen in recent years over the reluctance of particular U.N. bodies to accommodate or even recognize groups less inclined to support particular treaty efforts. Such groups are typically fairly characterized as "conservative" advocacy groups. See FN 34, infra.

[25] See http://www.ngo.org/. The UN-sponsored NGO interface is the NGO Network, which happens to be sponsored by the U.N. It asserts the goal of NGO's is to "more effectively partner with the United Nations and each other to create a more peaceful, just, equitable and sustainable world for this and future generations."

are, in this order: agreement; signature—a discrete window for which is provided by each treaty; ratification—also provided for in each treaty;[26] and submission of ratification instruments.

Also relevant are post-ratification requirements—is a treaty self-implementing, or does it require implementing legislation?—and withdrawal—at what point is a commitment real enough that withdrawal is required, and how is it effected at various relevant stages?

This paper examines this process and certain implications arising from the stages of treaty agreement. It particularly explores unsettled questions regarding modern application of "advice and consent", including the scenario where an executive eschews "advice", what requirements exist of the U.S. post-signature but prior to Senate "consent", must a president transmit a treaty to the Senate before the Senate may attempt "consent", and which branch of government may withdraw us at what stage, and how? It also examines the burgeoning role of NGO's in the treaty process.

Thus discussion occurs principally in the context of the Kyoto Protocol. That unique agreement is signed, but not ratified.[27] President Bush assures Americans that by his being unhappy with the U.S. signature on the document the U.S. has "rejected" it, yet the signature remains unmolested. Compare this with the Rome Treaty, the Administration's rhetorical "rejection" of which was identical yet followed by formal expression of this position to the U.N. consistent with Vienna Article 18.[28] Also, the Bush State Department has in fact actually rejected a request to submit an instrument to the same effect. Kyoto's highly charged politics, and the treaty-status limbo those political pressures have yielded begs so many questions that it provides an excellent vehicle to study the relative commitments accompanying each step.

ROLE OF NONGOVERNMENTAL NGO'S IN THE TREATY PROCESS[29]

Treaty negotiations occur at formal summits, as well as intervening subsidiary body and preparatory sessions, all of which when conducted under the auspices of the United Nations do not limit participation to potential signatory states. Nongovernmental organizations, representing any conceivable interest group so long as approved by the United Nations, are permitted a quasi-formal role.[30] According to the U.N. Department of Public Information (DPI), NGO Section:

"A non-governmental organization is any non-profit, voluntary citizens' group which is organized on a local, national or international level. Task-oriented and driven by people with a common interest, NGO's perform a variety of services and humanitarian functions, bring citizens' concerns to Governments, monitor policies and encourage political participation at the community level. They provide analysis and expertise, serve as early warning mechanisms and help monitor and implement international agreements. Some are organized around specific issues, such as

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[26] International law and individual treaties recognize differential requirements, from unilateral power of binding commitment in an executive to some version of legislative approval. See Vienna, e.g., Article 14.

[27] One need not look beyond the "environmental" context to find numerous such agreements, e.g., various individual Protocols to the 1979 Convention on Long-Range Transboundary Air Pollution, the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Convention on Environmental Impact Assessment in a Transboundary Context, and so on. The relevant inquiry, as discussed herein in the Kyoto and Rome contexts, is what risk does an ambiguous status regarding a particular instrument pose.

[28] See letter to U.N. Secretary General Kofi Annan, http://www.state.gov/r/pa/prs/ps/2002/9968.htm.

[29] For a comprehensive assessment of NGO participation, see Sheehan, "Global Greens" (Capital Research Center, 1998).

[30] Generally, and the DPI disclaimer, supra, notwithstanding, members of accredited NGO's are accorded preferred access and privileges not available to the public, to facilitate interaction with U.N. operations, which interaction can vary based on the subject matter discipline involved. See http://www.ngo.org/ index2.htm, link to "NGO Access to UNHQ". Indeed, UNDPI/NGO asserts: "The Department of Public Information and NGO's cooperate regularly. NGO's associated with DPI disseminate information about the U.N. to their membership, thereby building knowledge of and support for the Organization at the grassroots level. This dissemination includes: Publicizing U.N. activities around the world on such issues as peace and security, economic and social development, human rights, humanitarian affairs and international law; Promoting U.N. observances and international years established by the General Assembly to focus world attention on important issues facing humanity." See http://www.ngo.org/index2.htm, link to "applications for associative status with DPI". The general public is not permitted access to functions. A state's delegation, however, may include parties who do not have negotiating authority and who need not even hold some governmental post, though they are afforded full access, and limited participation. Senator Al Gore was a member of the United States delegation to Rio, from which perch he vocally criticized the delegation. Also, NGO participation is feasible, for example, in bilateral negotiations, if the parties agree.

human rights, the environment or health. Their relationship with offices and agencies of the United Nations System differs depending on their goals, their venue and their mandate.

Over 1,500 NGO's with strong information programmes on issues of concern to the United Nations are associated with the Department of Public Information (DPI), giving the United Nations valuable links to people around the world. DPI helps those NGO's gain access to and disseminate information about the range of issues in which the United Nations is involved, to enable the public to understand better the aims and objectives of the world Organization."[31]

The process for becoming an accredited NGO is subjective, offering the United Nations discretion in who or what group it allows for what purpose(s). Recently, on an ad hoc basis, the relevant accrediting body has requested information on financial donors and required proof of an international presence as conditions precedent of selective (and, to the author's knowledge, exclusively "conservative") NGO's.

UNDPI criteria for NGO's to become associated with DPI are as follow:

"Organizations eligible for association with DPI are those which:

- Share the ideals of the U.N. Charter;
- Operate solely on a not-for-profit basis;
- Have a demonstrated interest in United Nations issues and proven ability to reach large or specialized audiences, such as educators, media representatives, policymakers and the business community;
- Have the commitment and means to conduct effective information programmes about U.N. activities by publishing newsletters, bulletins, and pamphlets; organizing conferences, seminars and round tables; and enlisting the cooperation of the media."[32]

UNDPI describes the procedure to become an associated NGO as follows:

"An NGO that meets the established criteria should send an official letter from its headquarters to the Chief of the NGO Section, Department of Public Information, expressing interest in association with DPI. The letter should state the reasons why the organization seeks such association and should briefly describe its information programmes. This letter should be accompanied by at least six samples of recent information materials produced by the applying organization. Letters of reference from U.N. Departments, U.N. Programmes and Specialized Agencies, and/or U.N. Information Centres and Services (UNICs and UNISs) will greatly enhance consideration of the application.

Once the application process is completed, the DPI Committee on Non-Governmental Organizations will review applications at its scheduled sessions. Applicants are notified immediately of the results of the Committee's deliberations. Associated NGO's are then invited to designate their main and alternate representatives to the Department of Public Information.

Please note: Association of NGO's with DPI does not constitute their incorporation into the United Nations system, nor does it entitle associated organizations or their staff to any kind of privileges, immunities or special status."[33]

Clearly, the application process is subjective and, arguably, institutionally biased toward participation by a preponderance of groups considered sympathetic to the relevant summit's cause (that is, against dissent).[34]

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[31] See http://www.ngo.org/index2.htm, link to "applications for associative status with DPI". This dynamic began, according to UNDPI, "The importance of working with and through NGO's as an integral part of United Nations information activities was recognized when the Department of Public Information was first established in 1946. The General Assembly, in its resolution 13 (I), instructed DPI and its branch offices to " . . . actively assist and encourage national information services, educational institutions and other governmental and non-governmental organizations of all kinds interested in spreading information about the United Nations. For this and other purposes, it should operate a fully equipped reference service, brief or supply lecturers, and make available its publications, documentary films, film strips, posters and other exhibits for use by these agencies and organizations.' In 1968, the Economic and Social Council, by Resolution 1297 (XLIV) of 27 May, called on DPI to associate NGO's, bearing in mind the letter and spirit of its Resolution 1296 (XLIV) of 23 May 1968, which stated that an NGO". . . shall undertake to support the work of the United Nations and to promote knowledge of its principles and activities, in accordance with its own aims and purposes and the nature and scope of its competence and activities". Id.

[32] See http://www.ngo.org/index2.htm, "applications for associative status with DPI".

[33] Id. See FN 30, supra, re: disclaimer/privileges.

[34] See http://www.ngo.org/index2.htm, link to "applications for associative status with DPI". The UN's NGO home page offers a feel for the type of organizations it seeks to include, the description of which rings of the U.N. endorsement of its typical endeavors, with which the NGO's are to have input: "Its aim is to help promote collaborations between NGO's throughout the world, so that together we can more effectively partner with the United Nations and each other to create a more peaceful, just, equitable and sustainable world for this and future generations."

For an example of NGO participation, consider the 1992 the U.N. Conference on Environment and Development (UNCED or "Earth Summit") in Rio de Janeiro, likely the largest treaty summit in recent memory, though soon to be eclipsed by "Rio-plus–10" the World Summit on Sustainable Development in Johannesburg, August 2002. Rio is commonly recognized as ushering in the boom era of mass NGO participation. Rio has the added relevance for these purposes as being the session that produced, inter alia, the UNFCCC,[35] that the Kyoto Protocol amends by making its universal voluntary "commitments" mandatory for certain among the world's economic powers.

In the summer of 1992, as the United States Presidential and general elections prepared to launch, nations of the world convened in Rio for the UNCED under the guise of the United Nations Environment Programme (UNEP), which is under the direction of the U.N. General Assembly.[36] Numerous non-binding, in effect, position papers were generated with great effort, though disagreement tended to be more fairly characterized as disputes over whose priority was granted highest esteem.[37] Several other documents emerged from the fortnight-long diplomacy, the binding nature of which are arguable given a great degree of voluntariness but which nonetheless rose to the level of "treaty".[38]

Participants at Rio included delegations from all recognized national governments including scores of heads of state. 95 NGO's plus numerous among their subsidiaries were accredited representing national, regional and international common interests or agendas. These interests ranged from scientific and even architectural and various other professional societies, industry and laborers, gender and environmentalist pressure groups and/or their legal arms, spiritual to indigenous peoples.[39] These were condensed in practice at the summit under the "Global Forum," to centralize their presence, and voice. The latter act presumes NGO support for the summit undertakings.

NGO activities ranged from the informal—media availabilities, pamphlet and newsletter distribution—to quasi-formal—presentation of the product of petition drives before the plenary and subsidiary body sessions.[40]

Though NGO's have no formal vote or role at negotiations, efforts have been underway for some time to find paying roles for NGO's in implementing and monitoring compliance with treaty agreements. Specifically, for example, environmentalist advocates seek a formal paying role as an independent auditing and verification monitors of company and country GHG emissions/reductions.[41] Indeed, domestically, NGO's have already received literally millions of taxpayer dollars to advocate Kyoto.[42]

Many agreements, be they addressing environment or human rights, offer the potential for such business opportunities. That is one way the NGO's elevate their "negotiating" presence. They do have potential interests at stake to pursue, just as they possess an impressive media presence and potentially valuable approval to grant to or withhold from parties.

Representatives of groups directly impacted by potential commitments—industry and labor—were fairly limited in Rio (approximately 20 percent of the accredited NGO's) and fairly split between those standing to lose economic activity—anti-energy-suppression interests such as the coal industry, energy users, mine workers—

That is, organizations whose application reference materials demonstrate opposition to UN-sponsored initiatives face an adversarial review of their application. For a report on bias in the selection process, see, e.g., http://www.washtimes.com/national/20020511–32784532. htm, in the context of the 2002 U.N child Summit (UNICEF).

[35] See http://usinfo.state.gov/usa/infousa/laws/treaties/conv.htm.

[36] See http://www.un.org/aboutun/chart.html.

[37] Among the international "agreements" being developed were the Rio Declaration, and the similar if much more exhaustive (600 pages) Agenda 21. These were enormous if non-binding documents containing a lot of "shoulds", but as accurately characterized by the Cato Institute's P.J. O'Rourke, each "having the same approximate force in law as a note passed in study hall." (All the Troubles in the World, p. 214, 1994).

[38] See, e.g., Convention on Biological Diversity, actually finalized in Rio. United Nations, Treaty Series, vol. 1760, p. 79; and depositary notification C.N.329.1996.TREATIES–2 of 18 March 1996.

[39] See UNFCCC NGO roster, at http://unfccc.int/sessions/97feb/ngo.htm.

[40] For the schedule of Johannesburg NGO events, see http://www.worldsummit.org.za/.

[41] Under Kyoto this would be pursuant to Article 17: "The Conference of the Parties shall define the relevant principles, modalities, rules and guidelines, in particular for verification, reporting and accountability for emissions trading. "

[42] See, e.g., "Cashing in on Global Warming", http://www.cei.org/gencon/005,01248.cfm.

and those seeking "rents" through GHG restrictions with mechanisms such as credit-trading schemes.[43]

By the time of the July 2002 "COP 6.5" in Bonn, Germany, sufficient "industry" NGO's, falsely presumed as a matter of practice to be "anti-Kyoto", attended that the U.S. State Department had informally begun addressing two discrete constituencies in separate, restricted briefings. This did not accurately bifurcate the ideological or substantive positions of the groups, but rather manifest a common predisposition—that State representatives simply had to know was false—that Kyoto, and environmental agreements generally, created a clash of "industry vs. environmentalists." In fact, industry groups are among the most aggressive "direct" pro-treaty lobbying forces at treaty negotiations and elsewhere, and aggressive in their indirect advocacy (funding green and business advocacy groups).[44]

Therefore, while State deemed a separation of ideologies as appropriate it did so such that pro-Kyoto NGO's constituted one group, while the other advocacy section supposedly competing for State's ear consisted of a deeply split "Industry" cadre, despite pro-Kyoto industry being at least equally represented as Kyoto opponents. This skews the NGO input at least so far as concerns the U.S. delegation, offering pro-Kyoto NGO advocates a de facto greater advocacy role.[45] This matters because, as discussed, infra, the U.S. has not withdrawn from Kyoto but retains its signature and continues to send a full delegation to negotiations, even if they curiously assume a reduced role.[46]

In conclusion, treaty negotiations take place among delegates, though NGO's serve as welcome pressure groups, with a limited formal role but a select membership chosen by proponents of the agreement on the table.

THE TREATY POWER UNDER THE UNITED STATES CONSTITUTION

In the United States, treaty power is governed by Article II Section 2 of the Constitution, stating "[The President] shall have Power, by and with the Advice and Consent of the Senate, to make Treaties, provided two thirds of the Senators present concur". Therefore, the Executive may negotiate agreements, the terms of which do not, pursuant to our own Constitution, become effective against the U.S. until and unless the Senate ratifies the agreement by two-thirds of those voting.[47]

It does not seem there was any doubt during its formulation that the Constitution would permit treaties, which, to the extent they transfer any authority outside of the system the Constitution established, potentially threaten the very document authorizing such agreements. Discussion of the treaty power among the Framers appears principally confined to the necessity to concentrate it at the Federal level, so as to not be "liable to the infractions of 13 different legislatures, and as many dif-

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[43] For example, an immediate post-negotiation internal Enron memo, dated December 12 1997 and written by the Enron Corp. 's representative attending Kyoto, excitedly described Kyoto as "precisely what [Enron has] been lobbying for," cited numerous "wins", and concluded: "This agreement will be good for Enron stock!!" The reasons for Enron's advocacy are numerous, and similar to various other business NGO participants'. Enron held positions as owner of the world's largest wind turbine manufacturer and half owner of the world's largest solar energy venture, both of which would have faced tremendously increased markets under Kyoto's effective requirement of dramatically lowered fossil fuel use (particularly coal) among developed countries. For similar reasons, Enron faced tremendous earnings prospects from its large natural gas holdings and its gas pipeline network, the world's largest outside of Gazprom. For disclosure, the author briefly worked for Enron, during which time this effort was a source of disagreement.

[44] Re: the former, see, e.g., Alexander Cockburn, "An Enron Tale of Strange Bedfellows," Los Angeles Times (December 28, 2001). The latter is manifested by the "Business Council for a Sustainable Energy Future" and its European counterpart, constituted by (at the time) Enron and like-minded interests.

[45] For NGO claims of influence see "Greens' Success at Kyoto", http://www.cei.org/gencon/014,02873.cfm

[46] See FN 123, infra.

[47] This clearly does not require 67 votes as is often asserted. "Although the number of Senators who must be present is not specified, the Senate's practice with respect to major treaties is to conduct the final treaty vote at a time when most Senators are available." See, "Treaties and Other International Agreements: The Role of the U.S. Senate", p. 11, at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname= 106—cong—senate—print&docid=f:66922.pdf. Compare this "present" requirement with other "two thirds" requirements, Article I, Section 5, regarding House impeachments; Article I Section 7 re: veto override; and Article V re: proposing amendments to the Constitution.

Hamilton addressed the deliberation over two-thirds of those "present", vs. of the body as constituted, in Federalist No. 75. There, he identified the fear about "as constituted", that a minority of Senators could impede ratification through simple, convenient absences. See "Consent", infra, for further discussion.

ferent courts of final jurisdiction, acting under the authority of those legislatures", and thus "protect the faith, the reputation, the peace of the whole union."[48]

In Federalist No. 64 Jay addressed an apparent, similar multiple actor problem but through vesting the treaty power in a dynamic, impressionable "popular assembly", advocating instead housing principal authority in the executive. In Federalist No. 69 Hamilton weighed the merits of vesting the power solely in the executive, musing over what he later described as "the trite topic of the intermixture of powers," albeit one addressed amongst the Framers "with no small degree of vehemence."[49]

Arguably, modern conflicts arising from signed-but-not ratified treaties are a problem easily avoided, or at least mitigated, were the treaty power fixed solely within one branch (certainly, if with the Executive). Still, the practical, political problems discussed herein, borne of the simple bifurcation of authority, do not seem to have registered discussion by the Framers. One can safely presume this is because the Framers did not envision "permanent alliances" becoming so profuse that hundreds of modern instruments would emerge to the extent even of addressing unification of road signals.

Pertinent to this discussion, the Framers likely also could not envision commission to a treaty such as Kyoto: international agreements to curb domestic behavior to retard what is inarguably a marginal contribution to a hypothetical risk—man-made climate change—even in advance of science advancing the hypothesis some appreciable degree toward knowledge. Similarly, it is difficult to fathom the Framers envisioning administration of their creation such that scores of treaties would receive an executive signature yet never face Senate consideration. Times change, and with them perspectives. As Rabkin plainly asserts "[l]egal scholars no longer take the constitutional strictures of earlier times so seriously."[50] Now, "in the view of legal scholars, anything might be the proper subject of a treaty."[51] This, in an undeniable spiral of cheapening the seriousness of "permanent alliances" against which President Washington warned in his Farewell Address.[52]

One constitutional ambiguity arises in the question of which agreements rise to the level of a "treaty" requiring Senate ratification?[53] Further, notwithstanding the

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[48] See Hamilton, Federalist No. 22, sentiments repeated by Madison in Federalist No. 44.

[49] Federalist No. 75.

[50] "Sovereignty" at 18. The same can be said for policymakers, be they elected, appointed or career. See Chief Justice Hughes' admonition, supra.

[51] Id. at 22.

[52] Farewell Address, delivered on September 17, 1796. Washington similarly urged that the US must "Act for ourselves and not for others," by forming an "American character wholly free of foreign attachments." See http://www.house.gov/paul/tst/tst2002/tst041502.htm.

[53] This issue arises from other powers found in Article II of the Constitution, specifically the Executive Power Clause (Section I), the Commander-in-Chief Clause (Section 2) and, most interesting, the duty to take Care that the laws are "faithfully executed", which concludes Section 3. "Where the powers of the President are exclusive—as the Commander in Chief power—the President may make an international agreement solely on his own. Such agreements are often called sole executive agreements." National Treaty Law and Practice (Austria, Chile, Columbia, Netherlands, U.S.) eds. Monroe Leigh, Merritt R. Blakeslee, and L. Benjamin Ederington. Washington, DC, American Society of International Law 1999, Chapter 6, National Treaty Law and Practice: United States (Robert E. Dalton), "Section G, Legal Bases for Agreements Not Formally Approved By the Legislature". See http://www.asil.org/ dalton.pdf. This document offers an extensive discussion of this issue, including a discussion of United States v. Belmont (301 U.S. 324 (1937)), involving an intermingling in one document of assignment of funds and U.S. recognition of the Soviet Union. There, the Court asserted as regards the particular agreement at issue, "[A]n international compact, as this was, is not always a treaty that requires the participation of the Senate," but in this case an exercise of the President's power to enter executive agreement pursuant to his independent authority. Id. at 330.

The Court asserted limits to the reach of this duty to "take Care", in Youngstown Sheet & Tube Co. v. Sawyer, 343 U.S. 579 (1952). The Court determined that President Truman usurped the lawmaking power of Congress by his claim of independent constitutional authority to take control of and operate the nation's steel mills during the Korean War on the basis of on an "inherent" power to protect the well-being and safety of the Nation as well as his Article II exclusive powers as Commander-in-Chief and executive.

Finally, see also "Treaties and Other International Agreements: The Role of the U.S. Senate", pp. 25–26, at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=106—cong—senate—print &docid=f:66922.pdf.

The State Department defines "treaty" as follows: "International agreements (regardless of their title, designation, or form) whose entry into force with respect to the United States takes place only after the Senate has given its advice and consent". See "Department of State Circular 175, Procedures on Treaties", Foreign Affairs Manual, 11 FAM 700, Treaties and Other International Agreements, TL:POL–36, Revised February 25, 1985, Sec. 11 FAM 721.2 "Constitutional Requirements".

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ratification requirement, the treaty process inherently requires executive commitment of a sort. What are the other implications of such a commitment, now that we have seen that this practice does not in fact even serve the protocol function of a qualifying a state for ratification?[54] Can an Executive validly agree to treaty language circumventing constitutional requirements?[55] These questions and their answers, to the extent they exist, are exemplar of the murky nature of this field of law, driven in practice less by established legal rules than protocol. This curiosity extends to U.S. practice, whereby both the executive branch and Senate operate on the presumption that the Senate may not consider a treaty until a President transmits it to the Senate, though such requirement is found neither in the Constitution nor U.S. laws.[56]

Congress has formalized this delegation power, for certain Presidential authorities regarding the conduct of foreign affairs, in the State Department's authorizing statute.[57] In practice this delegation includes signing (and withdrawing from) treaties.[58]

The requirement of Senate "Advice" is not as straightforward as a plain reading of Article II intimates. Here, Kyoto also offers an interesting case study, as a treaty entered in spite of formal if non-binding (and unsolicited) Senate advice.[59] An Exec-

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The Vienna Convention, Article 2, defines "treaty" for its purposes as: "an international agreement concluded between States in written form and governed by international law, whether embodied in a single instrument or in two or more related instruments and whatever its particular designation".

[54] See "Signature" discussion, infra.

[55] A simple answer might seem to be that the Constitution cannot be read to permit commitments in violation of its terms, which terms may only be amended by the prescribed amendment process. Things are not that simple, however, such that this question is beyond the scope of this paper. See Rabkin, pp. 10–22. Commitments raising this tension are nonetheless made. Consider the Vienna Convention, a document that claims to bind parties to such documents, to some degree, by mere signature. Does that signature in fact violate the Constitution? Can a signatory state plausibly claim they are not bound to any degree by a treaty that acknowledges signature as imputing a level of pre-ratification commitment?

[56] See discussion of "Submission," infra. Senate rules indicate it has indirectly established "transmission" as a condition precedent. These rules do not, however, make clear that the Foreign Relations Committee can refuse to consider a treaty on the basis that it was never transmitted—an unlikely controversy. A more likely battle would pit a White House opposed to ratification objecting to FRC consideration of a treaty on the basis that there was never a transmittal. The prospect of such a conflict, though facially bizarre prospect given a president apparently retains the right to effectively withdraw the U.S. signature until some point in the pre-ratification stage (pre-transmittal, or pre-vote, or post-defeat but returned to Committee as pending matter). See, e.g., http://www.state.gov/r/pa/prs/ps/2002/9968.htm.

These prospects further warrant consideration not merely because the signature by an executive poses some level of commitment to a treaty's objectives, if not its specific terms. Consider also a Senate and White House deeply divided, rhetorically at least, over a signed-but-not-ratified treaty as they appear to be over Kyoto, and the potential showdown over "advice and consent" which that conflict poses.

[57] "22 U.S.C. Sec. 2656.—Management of foreign affairs. The Secretary of State shall perform such duties as shall from time to time be enjoined on or intrusted to him by the President relative to correspondences, commissions, or instructions to or with public ministers or consuls from the United States, or to negotiations with public ministers from foreign states or princes, or to memorials or other applications from foreign public ministers or other foreigners, or to such other matters respecting foreign affairs as the President of the United States shall assign to the Department, and he shall conduct the business of the Department in such manner as the President shall direct." It is certainly this general authority that State exercised in notifying the U.N. that the US has no intention to be bound by the Rome Treaty (its 6 May 2002 letter to U.N. Secretary General Annan (see text at www.state.gov/r/pa/prs/ps/2002/9968.htm).

[58] See e.g. Kyoto, signed by USA's functioning U.N. Ambassador, Peter Burleigh. See http://www.bellona. no/en/b3/air/climate/buenos—aires/10952.html.

[59] "Byrd-Hagel," S.Res. 98 105th Congress (105–54, 1997). The operative language is as follows: "Resolved, That it is the sense of the Senate that——

(1) the United States should not be a signatory to any protocol to, or other agreement regarding, the United Nations Framework Convention on Climate Change of 1992, at negotiations in Kyoto in December 1997, or thereafter, which would——

(A) mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period, or

(B) would result in serious harm to the economy of the United States".

Kyoto nonetheless emerged, clearly not satisfying Byrd-Hagel condition (1)(A), by differentiating not only between 36 "covered" countries, but by differentiating the commitments among those countries. Regarding condition (1)(B), among prominent economic analysts only the Clinton White House's Council of Economic Advisors, contended that no "serious economic harm". President Clinton never submitted the treaty to the Senate over the course of the remaining 27 months of his presidency. Upon leaving office the relevant CEA professionals publicly amended their assertions regarding Kyoto's economic impact. (See USA Today, June 12, 2001). See discussion of "Advice, infra.

utive eschewing Senate advice does not as a matter of law doom a treaty as failing to meet constitutional muster. An Executive subsequently nullifying the U.S. signature, or a Senate vote on ratification, should be the final word on that though, again matters in practice have not developed quite so simply.[60]

The concerns raised by an Executive "freelancing" treaty commitments without seeking or heeding Senate advice can be further compounded by a treaty barring the standard practice of a party to set forth objections and/or reservations.[61] It is through such objections and reservations, asserted by the Senate as a condition of ratification, that makes policy development by supranational bodies constitutionally tolerable given their lack of checks and balances, and limited accountability.[62] Yet the U.S. agreed to and then signed the Kyoto Protocol despite it having exacerbated the sin of omission of seeking Senate advice with the rare, express prohibition of reservations.[63]

The Senate Foreign Relations Committee Report serving as the Senate's most formal statement on these matters outside of Standing Senate Rules states the following regarding nearly this precise circumstance, except for the compounding factor of eschewing advice prior to the "no reservation" constraint:

"Some multilateral treaties have contained an article prohibiting reservations. The Senate Foreign Relations Committee has taken the position that the executive branch negotiators should not agree to this prohibition. The Senate has given its advice and consent to a few treaties containing the prohibition, but the committee has stated that approval of these treaties should not be construed as a precedent for such clauses in future treaties. It has further stated that the President's agreement to such a clause could not constrain the Senate's right and obligation to attach reservations to its advice and consent."[64]

Specifically addressing the UNFCCC, which the Senate nonetheless quickly ratified despite its own "no reservations" clause, the same Report cautions "The Foreign Relations Committee has cautioned the administration that Senate consent in these cases should not be construed as a precedent."[65] The Report went on to caution against any attempt to alter the UNFCCC's voluntary scheme by committing to mandatory reductions, asserting any such commitment would require ratification.[66] The Report then recites Senate intervention when the negotiations appeared to be headed toward not merely binding commitments requiring subsequent ratification, but differential commitments among parties with likely serious U.S. economic impacts.[67]

A fair question is: which is the more constitutionally offensive practice? 1) Eschewing advice and committing to a treaty yet not offering the Senate its opportunity to consent or disapprove; or 2) rescinding the U.S. signature from one "rejected", signed-but-never-submitted treaty, on the express basis that "even without ratification, the president's signature conveys standing and a U.S. obligation to support and not undermine the Treaty" (see Rumsfeld comments, p. 27, infra), yet not similarly treating other rhetorically "rejected" agreements.

[60] "(6) Treaties Reported by the [Foreign Relations] Committee but neither approved nor formally returned to the President by the Senate are automatically returned to the Committee calendar at the end of a Congress; the Committee must report them out again for the Senate to consider them." Therefore, a "defeated" treaty is not necessarily rejected until it is returned to the President. See "Treaties and Other International Agreements: The Role of the U.S. Senate", p. 12; see http://frwebgate.access.gpo.gov /cgi-bin/getdoc.cgi?dbname=106—cong—senate—print&docid=f:66922.pdf. The Senate may also keep a "defeated" treaty alive by adopting or entering a motion to reconsider. Id. at 3.

[61] "The conditions included by the Senate in its resolutions of advice and consent to ratification fall into four general categories: reservations, understandings, declarations, and provisos." National Treaty Law and Practice (Austria, Chile, Columbia, Netherlands, U.S.) eds. Monroe Leigh, Merritt R. Blakeslee, and L. Benjamin Ederington. Washington, DC, American Society of International Law 1999, Chapter 6, National Treaty Law and Practice: United States (Robert E. Dalton), p. 6.

Vienna Article 2 defines "reservation" as: "a unilateral statement, however phrased or named, made by a State, when signing, ratifying, accepting, approving or acceding to a treaty, whereby it purports to exclude or to modify the legal effect of certain provisions of the treaty in their application to that State". Part Two of Vienna, Articles 19–23, address reservations exclusively.

[62] See, e.g., Rabkin, p.ix.

[63] Kyoto Article 26 asserts, in toto: "No reservations may be made to this Protocol."

[64] "Treaties and Other International Agreements: The Role of the U.S. Senate", p. 2.

[65] Id. at p. 274.

[66] Id. at 276.

[67] "In mid–1997, as these negotiations were underway, the Senate passed S. Res. 98, which stated that the Senate would not approve any agreement on binding reductions in greenhouse gases that did not include commitments by developing countries as well as developed/industrialized countries, or that would result in harm to the U.S. economy. The administration has not transmitted the Kyoto Protocol to the Senate because, among other reasons, developing coun-

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Kyoto nonetheless emerged as such a "take it or leave it" document but with no "fast-track" type authorization or abdication. Indeed, it is fair to say the opposite vote was registered though non-binding by necessity given the nature and timing of such a preemptive strike. NAFTA can therefore hardly be analogized to Kyoto as both having been similarly foisted upon the Senate, though it is noteworthy that the composition of Congress can certainly change measurably in the interim between fast-track approval (or Byrd-Hagel) and the opportunity to offer consent.

This combination found in Kyoto of not obtaining (ignoring) Senate advice and restricting permissible consent is constitutionally indefensible in theory, though it does not impede Senate ratification. Indeed, it is now accepted practice for Congress to offer advance approval of suspending the Senate ability to provide objections and/or reservations when voting on ratification of specific agreements.[68] "Some scholars have pointed out the constitutional difficulties of this scheme, but it did not raise any great controversy."[69]

Signature

Individual agreements provide a window during which the document may be signed. For example, the Kyoto Protocol, agreed to in December 1997, was open for Party signature for a finite period of 1 year. As discussed, supra, that window and/or failure to sign the document were meaningless, as non-signatories subsequently ratified the Protocol. Whether signing the document is meaningless, however, is discussed, infra. The U.S. signed Kyoto on 12 November 1998.

It is clear from Article II, Section 2 that the Executive has the power to negotiate agreements if not de jure unilateral power to craft their content. This power to negotiate treaties doubtless includes the ability to make various, sub-ratification levels of commitment such as agreement and signature, so long as the agreement makes no pretense of abrogating the ratification requirement.[70] The "advice" limitation on this negotiating power is subject to Senate forgiveness (for the failure to seek advice), via providing consent nonetheless.

Most treaties provide for a discrete signing function as a condition precedent to being eligible to accede via ratification.[71] Signatures may be challenged but barring such challenge are presumed valid.[72] Questions arise, certainly in the recent contexts of the Rome Treaty and Kyoto Protocol, of other signature implications. Like most individual treaty documents "customary law" and its "codification" the Vienna Convention on the Law of Treaties[73] recognize the requirement of many systems of legislative approval for an agreement's specific terms to be binding.

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tries have to date not been willing to consider making binding commitments regarding their greenhouse gas emissions." Id.

[68] See, e.g., S. 2062 (107th Congress), "The Comprehensive Trade Negotiating Authority Act of 2002". The express logic behind providing this authority is to provide the President's negotiators the ability to strike deals not subject to subsequent modification as a condition of ratification, and their counterparts confidence in U.S. promises. It is arguable that congressional approval of such authority constitutes advice, if uninformed advice, still conditioned upon Senate ratification of the deal itself.

[69] Rabkin at 18.

[70] See Rabkin pp. 12–16.

[71] See FN 19, supra. Kyoto Article 24 states: "1) . . . This Protocol shall be open for accession from the day after the date on which it is closed for signature. Instruments of ratification, acceptance, approval or accession shall be deposited with the Depositary. 2. Any regional economic integration organization which becomes a Party to this Protocol without any of its member States being a Party shall be bound by all the obligations under this Protocol. In the case of such organizations, one or more of whose member States is a Party to this Protocol, the organization and its member States shall decide on their respective responsibilities for the performance of their obligations under this Protocol. In such cases, the organization and the member States shall not be entitled to exercise rights under this Protocol concurrently. 3. In their instruments of ratification, acceptance, approval or accession, regional economic integration organizations shall declare the extent of their competence with respect to the matters governed by this Protocol. These organizations shall also inform the Depositary, who shall in turn inform the Parties, of any substantial modification in the extent of their competence."

[72] Vienna sets forth generally, followed by an illustrative roster of, who may commit a state: "Article 7, Full powers: 1. A person is considered as representing a State for the purpose of adopting or authenticating the text of a treaty or for the purpose of expressing the consent of the State to be bound by a treaty if:

(a) he produces appropriate full powers; or (b) it appears from the practice of the States concerned or from other circumstances that their intention was to consider that person as representing the State for such purposes and to dispense with full powers." A state may subsequently confirm an unauthorized signature (Article 8).

[73] "The United States has not ratified the Vienna Convention but this portion likely represents customary international law on the subject." "Global Climate Change: Selected Legal Questions about the Kyoto Protocol", p. 3, FN 9. CRS Report for Congress (March 29, 2001).

The principle that a signature cannot be truly meaningless, developed likely for purposes of ensuring sincere negotiations, nonetheless was formalized as Vienna Article 18. That provision asserts international agreement that a pre-ratification commitment, e.g., signature, as nonetheless binding a state to certain degree.[74] Yet how seriously do states take this testament to the issue of a non-ratifying signatory state: "a State is obliged to refrain from acts which would defeat the object and purpose of a treaty," until and unless "it shall have made its intention clear not to become a party to the treaty, or it has expressed its consent to be bound by the treaty"?[75] It is either ironic, or proof positive that this effort failed, that the U.S. bears an enormous inventory of signed-but-not-ratified instruments including many never even "transmitted" to the Senate.

Defending a claim that the U.S. somehow violates Vienna Article 18 via, e.g., Kyoto, the U.S. would likely posit the argument that it never ratified Vienna. Particularly as regards Article 18, this argument is sophisticated. It requires a state to argue that it is not bound by signing a treaty that purports to govern the interpretation of treaties, the terms of which establish that signing a treaty in the absence of ratification still binds the signatory to the treaty's goals and objectives.[76]

It was presumably in recognition of the perils of feel-good treaty signature when a state has no intention of ratifying leading the Bush Administration to formally disavow its signature on the Rome Treaty. Consider the following statements by Cabinet officers:

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[74] Vienna manifests throughout, e.g., Articles 11, 12, 18, manifest that states operate on the presumption that a signature is the promise of a binding relationship, presumably through ratification. "A paramount principle of international law is pacta sunt servanda-that treaties must be kept." Senate Foreign Relations Committee, "Treaties and Other International Agreements: The Role of the U.S. Senate", S.Rpt. 106–71, p. 7; see http://frwebgate.access.gpo.gov /cgi-bin/ getdoc.cgi?dbname=106—cong—senate—print& docid=f:66922.pdf. What of the documents that a country signs, but does not ratify? That question and the ambiguous answers, to the extent they exist, prompted President Bush to withdraw from the unratified Rome Treaty. Specifically, the U.S. sought to avert legitimate concerns that its signature would impute some form of acquiescence with Rome.

However, many treaties are signed but not ratified, particularly by the US. The same ambiguities underlie the concerns over Kyoto discussed, herein. As with Rome, the President voiced his disagreement with his predecessor's signature. As regards Kyoto, however, he has not manifested this rhetoric with action. Consider that the President then offers and formally proceeds with a proposal clearly running counter to Kyoto's goals and objectives, as he did with his pending proposal to address U.S. GHG emissions. This proposal envisions emissions increasing, clearly in violation of Kyoto's objective of massive reductions. Certainly, mere proposals likely do not run hard afoul of Vienna. But what if the proposal is enacted?

[75] See "Withdrawal", infra.

[76] Consider a prospective automobile purchaser talking terms then taking the car off the lot for a spin, though without finalizing any deal. He parks it in his garage, and otherwise treats the offer of sale as a deal he accepted, for some period of time. Now consider the U.S. signing a treaty, though never formalizing the deal, yet also acting as if it had "bought" the agreement for 30 years through various and sundry diplomatic and administrative actions, or merely on the basis that it waited three decades before testing its strictures?

It is likely that such a doctrine of constructive acceptance exists in the law of international agreements. Vienna Article 11, "Means of expressing consent to be bound by a treaty," does not offer much guidance, asserting "The consent of a State to be bound by a treaty may be expressed by signature, exchange of instruments constituting a treaty, ratification, acceptance, approval or accession, or by any other means if so agreed." However, Part 5, "Invalidity, Termination and Suspension of the Operation of Treaties" makes the case more plainly: "Article 45 Loss of a right to invoke a ground for invalidating, terminating, withdrawing from or suspending the operation of a treaty: A State may no longer invoke a ground for invalidating, terminating, withdrawing from or suspending the operation of a treaty under articles 46 to 50 or articles 60 and 62 if, after becoming aware of the facts:

(a) it shall have expressly agreed that the treaty is valid or remains in force or continues in operation, as the case may be; or

(b) it must by reason of its conduct be considered as having acquiesced in the validity of the treaty or in its maintenance in force or in operation, as the case may be."

Media reports indicated that President Bush intended to withdraw from Vienna concurrent with his Rome withdrawal, though this did not occur. This would (or will) occur after having satisfied Vienna's Article 18 test for "withdrawal" of the unratified ICC. Clearly, therefore, such a move would be intended to impact the status of other signed-but-not-ratified agreements. Presuming this was successful (see FN 76, supra), particular implications of such a move as regards Kyoto include that the U.S. would be free of the Vienna Article 18 argument of commitment to Kyoto's object and purpose (if not residual "customary" doctrine, if any exists). The U.S. position would be that it is "out" of Kyoto solely on the basis that one executive verbally claimed that to be the case, with no formalization of that position. That is, the signed document remains available for "re-entry" by a subsequent executive solely on the basis that he verbally asserts that this is the U.S. position. To pursue or even enable such a dynamic is shortsighted and flies in the face of the bulk of the rationale behind treaties.

"Since we have no intention of ratifying it, it is appropriate for us, because we have such serious problems with the ICC, to notify the . . . secretary-general that we do not intend to ratify it and therefore we are no longer bound in any was to its purpose and objective" Secretary of State Colin Powell, CNN.com, May 5, 2002

"Even without ratification, the president's signature conveys standing and a U.S. obligation to support and not undermine the Treaty". Secretary of Defense Donald Rumsfeld, State Department Info, Jan. 11, 2001

Now, of course, the Administration faces the unavoidable question of why does it refuse to disavow the U.S. signature on Kyoto? That is, should it desire to avoid having, e.g., its proposed "Climate Action Plan" challenged as violative of Vienna, via Kyoto.[77]

These implications of treaty signature and the related quagmire of "how much sovereignty does (the U.S.) cede at what step?" is exemplar of the murky nature of this field of law, driven in practice less by established legal rules than protocol.

In sum, achieving the signature stage enters a state into an ambiguous level of commitment; obligations begin to emerge, such that a notification of intent not to become a party action is required to truly change a nation's status.

Executive Transmittal of a Treaty

Is there a reverse equivalent to the Constitution's "presentment" clause, for treaties?[78] A plain reading of Article II, Section 2 indicates an Executive's function is complete upon treaty signature, or at least that the signature reasonably triggers the Senate's ability to attempt consent though the Executive may not be stripped of authority to continue relevant treaty functions. Certainly, if a president transmits a treaty to the Senate with its concomitant request for a vote, there is no doubt that the Senate may vote upon it. But what about a treaty signed but not submitted to the Senate?

An authoritative Foreign Relations Committee report asserts the Senate's most formal position on the matter, outside of its standing rules which are largely silent or ambiguous:

"Consideration by the Senate

A second phase begins when the President transmits a concluded treaty to the Senate and the responsibility moves to the Senate.

Following are the main steps during the Senate phase.

(1) Presidential submission.-The Secretary of State formally submits treaties to the President for transmittal to the Senate. A considerable time may elapse between signature and submission to the Senate, and on rare occasions a treaty signed on behalf of the United States may never be submitted to the Senate at all and thus never enter into force for the United States. When transmitted to the Senate, treaties are accompanied by a Presidential message consisting of the text of the treaty, a letter of transmittal requesting the advice and consent of the Senate, and the ear-

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[77] Compare Administration statements on Kyoto remarkably similar to its rhetoric establishing why Rome must be "unsigned":

President Bush—"I'll tell you one thing I'm not going to do . . . I'm not going to let the United States carry the burden for cleaning up the world's air, like the Kyoto treaty would have done." ABCNews.com, March 28, 2001

President Bush—"I do not support the Kyoto Treaty . . . The Kyoto treaty would severely damage the United States economy and I don't accept that." Washington Times, June 5, 2002

Vice-President Cheney—"We do not support the approach of the Kyoto treaty." MSNBC March 17, 2001

Secretary of State Colin Powell—"The Kyoto Protocol, as far as the United States is concerned, is a dead letter." Interview with Fox News' Tony Snow, June 17, 2001

National Security Advisor Condoleezza Rice—to European diplomats, the "protocol is totally unacceptable and already dead at the arrival of the Bush Administration"; also quoted at the same meeting asserting Kyoto was "dead on arrival" in the United States. March 17th, 2001

National Security Advisor Condoleezza Rice—"It might have been better to let people know in advance, including our allies, that we were not going to support the protocol." USATODAY.com June 7, 2001

Environmental Protection Agency Administrator Christie Todd Whitman—"We have no interest in implementing that treaty." Washington Post, March 28, 2001

White House Spokesman Ari Fleischer—"The president has been unequivocal. He does not support the Kyoto treaty. It is not in the United States' economic interest." CNN.com, March 29, 2001

[78] U.S. Constitution, Article I, Section 7: "Every Bill which shall have passed the House of Representatives and the Senate, shall, before it become a Law, be presented to the President of the United States".

lier letter of submittal of the Secretary of State which usually contains a detailed description and analysis of the treaty."[79]

The Senate is historically conditioned to wait for executive transmittal prior to considering an agreement and its rules now recognize this practice, having in effect manufactured a "presentment" equivalent. The FRC Report offers in fact an explanation of protocol, and nothing more, serving as the principal impediment to the Senate considering a treaty absent the Executive transmitting it to them. There is no constitutional bar. Though the Senate has the constitutional right to set its own rules of operation,[80] there exists no express prohibition in the rules, either.[81] It is a matter of interpretation. These rules are binding of course only on the Senate but are a matter of interpretation, and that is largely irrelevant:

Yet these Senate rules do not make clear that the Foreign Relations Committee can refuse an Executive request to consider a treaty on the basis that it was never transmitted. Such a battle is of course unlikely: if an Executive desired a treaty vote he would in all likelihood "transmit" a treaty with such a request.[82] A conflict is more likely to involve a White House opposed to ratification, objecting to FRC consideration on the basis that there was never a transmittal. The prospect of such a conflict is also, however, facially bizarre given a president apparently retains the right to effectively withdraw the U.S. signature until some point in the pre-ratification stage (see "Withdrawal", infra).

As also discussed, in Kyoto we see a Senate and White House deeply divided, rhetorically at least, over a particular signed-but-not-ratified treaty. This merits consideration of the potential showdown over authority to ultimately commit the U.S. In this instance, we face a president asserting a position ("rejects" the treaty) but unwilling to formalize it. Indeed, this administration actually has rejected the idea of withdrawal.[83]

Whether an executive must "transmit" a treaty, or whether the Senate may vote on signed agreements of its own accord, is a question that has yet to be adjudicated. It has yet to even be legislated other than Senate internal rules of operation. Congress addressed transmittal of international agreements other than treaties in the Case-Zablocki Act.[84] This Act did not, however, indirectly establish Executive discretion regarding transmittal of treaties to Congress, as its clear import was to inform Congress of agreements in which Congress had had no consultative or approval role.

The Senate Foreign Relations Committee possesses exclusive congressional jurisdiction over treaties (though as was seen regarding Kyoto, other committees, both House and Senate, may weigh in on various aspects of the agreement). That is, FRC is the gatekeeper determining which treaties may be reported for floor consideration:

"RULE 1—JURISDICTION

(a) Substantive.—In accordance with Senate Rule XXV.1(j), the jurisdiction of the Committee shall extend to all proposed legislation, messages, petitions, memorials, and other matters relating to the following subjects: . . .

17. Treaties and executive agreements, except reciprocal trade agreements. . . .

(b) Oversight.—The Committee also has a responsibility under Senate Rule XXVI.8, which provides that ' . . . each standing Committee . . . shall review and

[79] "Treaties and Other International Agreements: The Role of the U.S. Senate", S.Rpt.106–71, p. 7.

[80] "Each House may determine the Rules of its Proceedings . . ." Article I, Section 5.

[81] With or without transmittal it would be fair for a Member (or private litigant who can establish standing) to call on the Senate to vote on the entire spate of modern treaties signed-but-not-ratified treaties. It seems particularly disrespectful of the Constitution, however, for the Senate not to at minimum vote on aberrations such as Kyoto, qualifying for immediate rejection because of the unacceptable combination of the Executive breaching specific Senate instruction, then accepting the disavowed terms also with a prohibition on reservations.

[82] Such a request does not necessarily accompany a transmittal recommendation. See discussion of President Reagan's transmittal of the Protocols to the Geneva Convention, infra.

[83] In May 2002, the author formally petitioned the State Department on behalf of the Competitive Enterprise Institute, to replicate the withdrawal from Rome, re: Kyoto. State responded in June 2002. It elected to not assert which of the two ambiguous U.S. Kyoto positions—rhetorical vs. submitted—is operative. Its response was mildly incoherent in attempting to avoid addressing the merits presented in the request, merely rejecting this request for clarification of the ambiguity on the simple basis that "[w]e have gone to considerable lengths, internationally, over the past year to make our position with respect to the Kyoto Protocol clear and unambiguous." In short, they're not confused about the position—whatever it is—so it requires no clarification.

[84] 1 U.S.C Sections 112a and 112b; as added by act of September 23, 1950, 64 Stat. 980; and added by Public Law 92–403 [Case-Zablocki Act, S. 596], 86 Stat. 619, approved August 22, 1972.

study, on a continuing basis, the application, administration, and execution of those laws or parts of laws, the subject matter of which is within the jurisdiction of the Committee.'

(c) 'Advice and Consent' Clauses.—The Committee has a special responsibility to assist the Senate in its constitutional function of providing 'advice and consent' to all treaties entered into by the United States and all nominations to the principal executive branch positions in the field of foreign policy and diplomacy . . .

RULE 9—TREATIES

(a) The Committee is the only Committee of the Senate with jurisdiction to review and report to the Senate on treaties submitted by the President for Senate advice and consent. Because the House of Representatives has no role in the approval of treaties, the Committee is therefore the only congressional committee with responsibility for treaties."

FRC Rule 9 then seemingly creates a transmittal condition precedent to considering a treaty:

"(b) Once submitted by the President for advice and consent, each treaty is referred to the Committee and remains on its calendar from Congress to Congress until the Committee takes action to report it to the Senate or recommend its return to the President, or until the Committee is discharged of the treaty by the Senate."

It does appear a Member is not able to move a treaty toward a floor vote in the absence of at least FRC consideration, though the relevant rule does not seem to resolve the question of whether the Senate can vote absent transmission (that is, take matters into its own hands to, e.g., clarify an ambiguous U.S. position):

"RULE XXX EXECUTIVE SESSION—PROCEEDINGS ON TREATIES

1. (a) When a treaty shall be laid before the Senate for ratification, it shall be read a first time; and no motion in respect to it shall be in order, except to refer it to a committee, to print it in confidence for the use of the Senate, or to remove the injunction of secrecy . . .

2. Treaties transmitted by the President to the Senate for ratification shall be resumed at the second or any subsequent session of the same Congress at the stage in which they were left at the final adjournment of the session at which they were transmitted; but all proceedings on treaties shall terminate with the Congress, and they shall be resumed at the commencement of the next Congress as if no proceedings had previously been had thereon.[85]

So, the Senate seemingly manufactures a "requirement" of presentment. This does not make that requirement law but likely demonstrates that a court might well defer a legal challenge to an ambiguous U.S. treaty posture under the "political question" doctrine. Such a challenge, for example, could seek formal withdrawal from Kyoto as a necessary step given the Executive's avowed rejection of a signed treaty. The State Department manifested the position, in the context of its communication to the U.N. regarding Rome, that withdrawal from such a document requires this transmission pursuant to the delegation of certain "Management of foreign affairs" in 22 U.S.C. Sec. 2656.[86] This because by that act the Bush Administration formally recognized the legal implications to signing a treaty, seemingly giving merit to such an effort to compel other withdrawals to resolve similar ambiguities and potential risks.

Still, this language raises an interesting debating point as to whether there is the equivalent of a "presentment" requirement. That is, the Senate arguably hereby distinguishes between "Treaties transmitted by the President to the Senate for ratification", and, "When a treaty shall be laid before the Senate for ratification", that is, of the accord of one of its Members.

There clearly is no constitutional prohibition to the Senate taking a signed treaty upon itself to consider, only a Senate rule possibly indicating they have decided otherwise. The Senate has the right to establish its rules of operation under Article I, Section 5, but that language offers no prohibition and indeed is ambiguous at best as to this matter. Certainly given the rhetoric of potential natural catastrophe surrounding Kyoto, if President Bush insists on continuing the U.S.' ambiguous role in Kyoto the Senate should take matters into its own hands, and decide the fate of this agreement.

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[85] Found at http://rules.senate.gov/senaterules/rule30.htm (emphasis added).

[86] See FN 57, supra.

Regarding the transmittal itself, by practice, this communication is considered formally as part of the Senate Treaty Document sent by the White House.[87] Clearly, a transmittal message need not request ratification, but an Executive certainly may ask the Senate to reject a treaty. Similarly, though not identical, is that in practice a transmittal letter does not require "transmission" of the particular treaty language for a vote, but can include a mere request that the Senate express its sense that the treaty is not acceptable. This likely satisfies the Vienna test for manifesting a state's intention to not be bound by a treaty, if it does not equate with rejection. President Reagan's transmittal of the 1977 Protocols to the Geneva Convention offers an example of what may be considered "risk-free transmittal", that is, asking for disapproval while not risking present or future ratification of the actual agreement.

After transmitting and asking for ratification of Protocol II, additional to the Geneva Conventions of 12 August 1949 concluded at Geneva on June 10, 1977, President Reagan requested the Senate express its sense of disapproval of Protocol I, which he did not transmit. Addressing in part a topic very timely to a current debate, specifically the status of certain combatants, President Reagan wrote:

"While I recommend that the Senate grant advice and consent to this agreement [Protocol II], I have at the same time concluded that the United States cannot ratify a second agreement on the law of armed conflict negotiated during the same period. I am referring to Protocol I additional to the 1949 Geneva Conventions, which would revise the rules applicable to international armed conflicts. Like all other efforts associated with the International Committee of the Red Cross, this agreement has certain meritorious elements."[88]

Calling Protocol I "fundamentally and irreconcilably flawed", Reagan described its flaws in principle and with some specific examples, then shifted the burden to the Senate without actually transmitting the Protocol with a recommendation to reject, stating in relevant part:

"These problems are so fundamental in character that they cannot be remedied through reservations, and I therefore have decided not to submit the Protocol to the Senate in any form, and I would invite an expression of the sense of the Senate that it shares this view."[89]

The deviation from form—sending treaty language for ratification—extended to the request—mere disapproval of non-transmitted language. Yet Reagan described his desired outcome as if it were a mere, standard "rejection":

"It is unfortunate that Protocol I must be rejected. We would have preferred to ratify such a convention, which as I said contains certain sound elements. But we cannot allow other nations of the world, however numerous, to impose upon us and our allies and friends an unacceptable and thoroughly distasteful price for joining a convention drawn to advance the laws of war . . . The repudiation of Protocol I is one additional step, at the ideological level so important to terrorist organizations, to deny these groups legitimacy as international actors. Therefore, I request that the Senate act promptly to give advice and consent to the ratification of the agreement I am transmitting today, subject to the understandings and reservations that are described more fully in the attached report. I would also invite an expression of the sense of the Senate that it shares the view that the United States should not ratify Protocol I, thereby reaffirming its support for traditional humanitarian law, and its opposition to the politicization of that law by groups that employ terrorist practices."[90]

This quasi-transmittal offers a model for Executive request of the Senate regarding other commitments through which the U.S. presents an ambiguous posture. It does not, however, guarantee clarification: The Senate elected to vote on neither Protocol, adding them to the heap of literally dozens of treaties signed but not ratified, not to mention those of which never were the subject of a "transmittal" to the Senate.[91]

This does offer authority for the proposition that the Senate need wait for neither a Presidential transmission of language, nor a request to ratify a treaty in order to speak to the issue of whether it accepts the commitment. In the case of Kyoto,

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[87] See, e.g., "The President's Transmittal Message", H.Doc. 107–20; http://frwebgate.access.gpo.gov/ cgibin/useftp.cgi?IPaddress=162.140.64.21&filename=td007.pdf&directory=/diskb/wais/data/107—cong—documents.

[88] United States: Message From the President Transmitting Protocol II Additional to the 1949 Geneva Conventions, Relating to the Protection of Victims of Noninternational Armed Conflicts, January 29, 1987 (http://www.fed-soc.org/pdf/ABARespID.pdf).

[89] Id.

[90] Id. (emphasis added).

[91] See http://www.icrc.org/eng/party—gc.

Byrd-Hagel has no relevant "consent" impact—though potentially great influence as "advice" eschewed—Kyoto not having been agreed at the time this (inherently) non-binding resolution passed.

Another question involves the implications of "transmitting" a treaty to Senate. Upon such communication, has the President ceded his ability to withdraw, as President Bush withdrew from Rome? If so, is it for a reasonable period for the Senate to act, say, the term of one Congress, which ability is revived by the absence of Senate action over another reasonable period of time?

Such resolution seems unnecessarily complex and, presuming no presentment requirement exists for treaties, two outcomes appear equally possible. The courts could determine some form of "mutual jurisdiction" during a post-transmittal, pre-vote stage, during which either branch may decide or at least advance the fate of an agreement. Alternatively, the courts could determine that such an Executive function should not be undertaken lightly. In such instance, they might reason, given that even post-transmission—whatever the request—the President retains the ability to formally request Senate rejection decide that upon transmission the Senate obtains sole jurisdiction.

Finally, the courts may determine that there is indeed a presentment requirement for treaties. In such case, it would be reasonable to rule that, just as the President has the right to sit on a treaty until presentment, the senate has the same right after presentment. Of course, even President Bush's recent withdrawal from Rome appears unprecedented, if precisely what longstanding international policy held to be appropriate behavior. Thus, despite that all of this remains conjecture, the increased possibility of challenge to these questionable modern practices merits inquiry.

ROLE OF CONGRESS IN THE TREATY PROCESS—ADVICE AND CONSENT

What obligations and impediments arise from the constitutional requirement of "advice and consent", particularly in the unique circumstances offered by development of Kyoto? Further, what role does the Senate play in possible withdrawal in such unique circumstances? Finally, if a ratified agreement is amended, is it subject to further advice and consent?

Advice: Kyoto Example

We have already examined the nontraditional role the Senate played in offering advice to the Executive regarding the Kyoto Protocol, development of which began soon after—and, arguably, partially as a consequence of—the inauguration of a new U.S. administration. As discussed, this process toward binding international commitments regarding domestic energy use emissions not declared, for the most part, "pollutants" by any nation in the world, came almost immediately on the heels of agreeing in Rio to the UNFCCC's voluntary campaign.[92] This, certain domestic efforts,[93] and a lack of administration solicitation of advice alarmed many within the Senate. As negotiations advanced, Senators took it upon themselves to register advice.

The Senate, seeing what was developing, unanimously passed a non-binding, "Sense of the Senate Resolution":

"Resolved, That it is the sense of the Senate that——

(1) the United States should not be a signatory to any protocol to, or other agreement regarding, the United Nations Framework Convention on Climate Change of 1992, at negotiations in Kyoto in December 1997, or thereafter, which would——

[92] Per Kyoto's Preamble, it developed, de jure, "Being guided by Article 3 of the Convention," (Principles), which was the omnibus "protect the planet" provision. This rationalization emerged, de facto, however directly pursuant to the new U.S. administration's assertion of "changed circumstances". The next step, of actually drafting a binding document, came "Pursuant to the Berlin Mandate adopted by decision 1/CP.1 of the Conference of the Parties to the Convention at its first session," as also set forth in Kyoto's preamble.

[93] Specifically, in 1993, the new Clinton-Gore Administration created a State Department slot for former Senator Tim Wirth, Undersecretary of State of Global Affairs, including in its portfolio "environment". Wirth was famous for his statement in 1990 as a Democratic Senator from Colorado, "We've got to ride the global warming issue. Even if the theory of global warming is wrong, we will be doing the right thing in terms of economic and environmental policy." Cited in "Global Warming: Just a Lot of Hot Air?", The Actuarial Review, August 1998 (Fred Kilbourne) (see http://www.casact.org/pubs/actrev/aug98/gwfredk. htm). Rio, in hindsight, soon began to look like an agreement whose authors had no sincere intent of determining its effectiveness when it was almost immediately used as a springboard to obtain mandatory, reduction commitments. In 1996, Deputy Assistant Secretary of State Rafe Pomerance asserted that "the administration has been working on this policy for more than a year", quoted in Nature, 25 July 1996.

(A) mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period, or

(B) would result in serious harm to the economy of the United States."[94]

Subsequent to this advice, and upon other nations of the world resisting U.S. positions, Vice President Al Gore arranged to fly to Kyoto, where he encouraged U.S. negotiators to show "increased negotiating flexibility." Kyoto emerged, clearly not satisfying Byrd-Hagel condition (1)(A) by differentiating between 38 "covered" countries. Opponents were also angry over the agreement to differentiate various commitments among those countries.[95]

Regarding condition (1)(B), among prominent economic analysts only the Clinton White House's Council of Economic Advisors, contended that no "serious economic harm" would result.[96] President Clinton never submitted the treaty to the Senate over the course of the remaining 25 months of his presidency. Upon leaving office the relevant CEA professionals publicly amended their assertions regarding Kyoto's economic impact.[97]

Administration disregard for Senate advice was exacerbated when the White House soon adopted a mantra of seeking "meaningful participation by key developing countries," a rhetorical sleight of hand to facilitate ratification. Still, this received no widespread condemnation, despite the administration's ploy being an apparent, significant diminution of the Senate's most prominent "Advice".

The composition of the Senate can change appreciably over a short time and, so long as the U.S. remains a signatory, it may feasibly ratify Kyoto.[98] All past sins of omission, and commission regarding the Article II "Advice" requirement are absolvable through a ratification vote.

"Consent", or Ratification

As noted, it is clear from Article II Section 2 that the executive has the power to negotiate agreements, and principal role therein. This typically involves at minimum one signature stage, at minimum as a protocol, formalizing" the signatory's eligibility for ratification.[99] However, it is also clear pursuant to Article II the terms of any agreement negotiated by the executive do not become effective against the U.S. until and unless the Senate ratifies the agreement by two-thirds of those voting.[100] This presumably intimates a limitation on the treaty power of an executive not being able to validly enter agreements circumventing the constitutional ratification requirement.[101] Further, this raises the possible issue of what rises to the level of a treaty requiring Senate ratification?[102]

Treaties typically recognize that a significant number of countries do not permit the "Executive" to formally bind his nation through a signature, but that it is a fairly common requirement that one or more legislative bodies approve of the document. To the extent a particular document does not address this issue, the Vienna Convention codifies the "customary" recognition of this practice. Treaties also typically provide a window for ratification. We have already seen, supra, the ambiguities surrounding whether the Senate may of its own accord consider a treaty for ratification.

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[94] "Byrd-Hagel," S.Res. 98 105th Congress (105–54 July 21, 1997).

[95] Specifically, parties committed to varying percentages of reduction from 1990 levels of GHG emissions. Some were permitted to increase emissions (e.g., Australia, by 8 percent), others permitted to pool their emission increases/reductions under a bubble (the EU), while the U.S. committed to reduce GHG emissions by 7 percent below 1990, or 19 percent below today's emission levels according to the Department of Energy's Energy Information Administration (EIA).

[96] EIA, e.g., estimated Kyoto's economic impact upon the U.S. economy at $400 billion annually. U.S. Department of Energy, Energy Information Admin., Office of Integrated Analysis and Forecasting. Impacts of the Kyoto Protocol on U.S. Energy markets and Economic Activity. Washington, DC. October 1998.

[97] See USA Today, June 12, 2001.

[98] True, as described, supra, several non-signatory nations ratified Kyoto nonetheless. These nations share neither our Constitution, nor our adherence to protocol, and it seems implausible that the U.S. Senate should ever reverse an Executive having rejected a signed, unratified treaty that the Senate has made no move to consider. It seems an open question whether Article II prohibits such an act.

[99] Some systems, as recognized by individual treaties and the Vienna Convention, allow for binding treaty commitments to arise from this signature, equivalent with, e.g., U.S. Senate ratification.

[100] See FN 47, supra.

[101] See FN 55, supra.

[102] See FN 53, supra.

The "Consent" function offers the Senate a second bite as the "Advice" apple. That is, with the rare exception found in Kyoto, treaties typically allow reservations and/or objections to particular provisions.[103] The executive may make suggestions regarding such objections, as it at issue in the current debate regarding Senate ratification of the Stockholm Convention on Persistent Organic Pollutants (POPs Treaty).[104] Domestic U.S. parties whose products or businesses would be covered by this agreement's restrictions seek ratification, but conditional upon one of two options in the treaty language over the addition of new chemicals to the list of covered substances.

Specifically, these parties seek a reservation to the effect that each addition to the list of covered chemicals requires discrete ratification by countries recognizing this addition. This raises another relevant "Consent" issue: whether treaty amendments require individual ratification. The treaty itself typically addresses this matter.[105] To the extent an agreement does not address this matter, Vienna offers ambiguous guidance as to what rule governs.[106] This contributes to the reality in practice that Senate ratification clearly can be made contingent upon any modifications to the particular treaty being subject to ratification prior to being binding on the U.S.[107]

Kyoto's amendment mechanism is set forth through various Articles. First, specifically discussing "non-compliance" and consequences," Article 18 reads, in pertinent part, "Any procedures and mechanisms under this Article entailing binding consequences shall be adopted by means of an amendment to this Protocol." Such amendment occurs as set forth in Article 20:

"1. Any Party may propose amendments to this Protocol.

2. Amendments to this Protocol shall be adopted at an ordinary session of the Conference of the Parties serving as the meeting of the Parties to this Protocol.

3. The Parties shall make every effort to reach agreement on any proposed amendment to this Protocol by consensus. If all efforts at consensus have been exhausted, and no agreement reached, the amendment shall as a last resort be adopted by a three-fourths majority vote of the Parties present and voting at the meeting. The adopted amendment shall be communicated by the secretariat to the Depositary, who shall circulate it to all Parties for their acceptance." (emphasis added)

Kyoto then proceeds to indicate that Senate ratification of Kyoto even in its current, incomplete form and without a specific reservation to this effect, nonetheless permits the U.S. to claim it is not bound by any subsequent narrowing of Kyoto's terms without separate ratification:

"4. Instruments of acceptance in respect of an amendment shall be deposited with the Depositary. An amendment adopted in accordance with paragraph 3 above shall enter into force for those Parties having accepted it on the ninetieth day after the date of receipt by the Depositary of an instrument of acceptance by at least three fourths of the Parties to this Protocol."

This is reassuring to some degree given that Kyoto permits all nations to vote on binding consequences applicable only to those 36 countries actually covered by Kyoto's restrictions. Reassuring as this "out" may be, it remains foreseeable that the requisite three-fourths of, e.g., all 178 parties to Kyoto should they ultimately ratify, can occur if that large universe of countries facing all benefit, no pain under Kyoto merely coalesce. The incentive to "stick it" to particular countries, for example the U.S., is enormous, given the amounts of money involved under a fully implemented rationing structure that is Kyoto. Given international pressures to proceed "with the flow" should the U.S. actually ratify Kyoto, this presents alarming opportunities for other nations to extract even more benefits out of the U.S. in this context than Kyoto's generous "capacity building" and "development" funds already envision.[108]

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[103] See the UN's Model Instrument of Reservation at http://untreaty.un.org/English/TreatyHandbook/ annex6.htm.

[104] See EPA statement on POPs Treaty at http://www.epa.gov/oppfead1/cb/csb—page/updates/popsleg.htm.

[105] See, e.g., Kyoto Article 20.

[106] See Articles 41, 42.

[107] In consenting to the Genocide Convention, the Senate added a reservation that the U.S. must first specifically consent to IJC jurisdiction before submitting any dispute to which the United States was a party. "Treaties and other International Agreements", p. 21.

[108] In response to this very practice of treaties moving far along in the development stage that it takes political capital, often not spent, to extricate from even that level of agreement, the Bush Administration has initiated an informal policy group to look down the road at potential such entanglements particularly in the environmental context. This would seem to be a lesson learned from Rio and Kyoto. Participants are drawn, inter alia, from the State Department, Council on Environmental Quality, and National Security Council.

Senate ratification cannot constitutionally be abrogated by the Executive,[109] though as we have seen Congress can anticipatorily abdicate the Senate's ability to modify an agreement's language, and thus its ability to offer substantive objections or reservations (though not to reject a treaty).[110]

Consideration of treaties must begin in the Senate Foreign Relations Committee. Again, and contrary to that reality that scores of treaties formally transmitted to the Senate lie dormant, Senate FRC Rule 9 calls for swift initiation of the consideration process:

d) Insofar as possible, the Committee should conduct a public hearing on each treaty as soon as possible after its submission by the President. Except in extraordinary circumstances, treaties reported to the Senate shall be accompanied by a written report.

As also discussed in "Transmittal", Senate Standing Rule XXX governs Senate treaty procedure.

The Constitution requires two-thirds of those "present," or voting. As mentioned, Alexander Hamilton foresaw possible political gamesmanship in the ratification process, detailed in Federalist No. 75. Hamilton argued that requiring two-thirds of those "present" would mitigate these opportunities. Hamilton's fears were prescient, though the resolved language suffers a similar soft underbelly for political hijinks.

Imagine one party seeing great political gain in voting for a politically charged treaty so long as it failed, and great peril—political and otherwise—if enacted. This describes the dynamic between many Senators and Kyoto. Extensive polling data show, for example, that the concept of "doing something" about "global warming" enjoys popular support so long as it remains a proposal potentially warding off future catastrophe. The actual requirements of massive energy use reductions, and how to attain them, are not quite so popular.

Consider a height of media and trade competitor outrage about a U.S. President having informally "rejected" a treaty, say after one World or Kyoto summit. The savvy Majority Leader might schedule a treaty vote (see debate over "Transmittal," supra). The intent would be the near-certain, near-unanimous support of one party and a nicely contrasting party bloc voting nearly unanimously against. Two-thirds would not be achieved. Whispers to the Majority party's business supporters could issue that the treaty stands no chance, so do not become alarmed. This display would provide one party an opportunity to declare their concern and support for a document that is politically advantageous among certain constituencies, while casting its opposition as heartlessly standing in the way. That party would carry a powerful rhetorical weapon into the next elections.

This scenario collapses should most, e.g., Republicans simply not be "present" come vote time. In such case, it seems highly likely the attempted ploy would severely backfire, to great fanfare and political heat from the other party's own "green" base. Members would rush to the well to change their vote, and/or the treaty would ultimately be pulled from consideration, naturally amid claims of the opposition's irresponsibility. The alternative to this retreat would be a party single-handedly responsible for the U.S. committing itself to a treaty wildly unpopular even in theory among most labor and energy consuming interests. For this reason, the required Senate vote remains subject to gamesmanship.

Further, and as referenced, supra, in theory problems can arise with agreements open for ratification though they are subject to further negotiations, and indeed may require significant narrowing of the meaning of its various provisions before offering sufficient detail to be enforceable or even considered a meeting of the minds. Kyoto is a sterling example of such problems.

Kyoto's express window for ratification was already open by, e.g., the November 2000 COP–6 in The Hague, and numerous countries had already ratified the agreement such that it could go into effect against them should it gain sufficient ratifications.[111] The Hague negotiations collapsed with no alteration or narrowing of the terms after the EU and U.S. avowed wildly divergent opinions on the meaning of several terms key to the agreement's financial impact on the U.S.[112] The parties im-

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[109] See Rabkin, pp. 12–16.

[110] See discussion of NAFTA, supra.

[111] Of course, these ratifying nations were not those facing actual emission reduction obligations under Kyoto, but among the 140 "exempt" nations, who were principally made eligible to receive wealth transfers under the treaty's auspices.

[112] These negotiations occurred after the U.S. Presidential election but prior to its resolution. There, the EU negotiators, likely sensing desperation on the part of Clinton Administration negotiators aware an administration opposed to Kyoto might well be inaugurated soon, refused to take "yes" for an answer on key issues on the table. Specifically, they held to a unique assertion

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mediately called "COP–6.5", held in Marrakech in September 2001, to resume negotiations. By that time, President Bush had taken office and repeated his campaign opposition to Kyoto, solidifying the rhetorical, if not de facto, "rejection" by the U.S. initiated at The Hague collapse.

Therefore, Kyoto actually collapsed, so far as U.S. participation is concerned, under the prior administration. The more relevant lesson is that treaties open for ratification can, and often do, present little in the way of an actual meeting of the minds permitting implementation and compliance. Ratification should always be undertaken warily, but, as this shows, should not even be considered when the treaty remains subject to determining what it is that parties actually agreed.

Deposit of Ratification Instrument

Despite the Clinton Administration negotiating Kyoto, for example, over the course of 25 months it never "communicated" the treaty to the Senate for a ratification vote.[113]

Still, though a ratification vote would create a stronger argument of commitment, under Vienna Article 18, than would mere signature, it does not formalize "consent to be bound by the treaty", pursuant to the terms of most pacts. Even after agreement, signature, and a ratification vote a country is not formally bound to the terms of a treaty until it submits its instrument of ratification.[114]

Post-Ratification

Treaties can either require parties to enact implementing legislation, or be "self-implementing", that is, needing no new authority to implement its terms.[115] Clearly, of course, as authorities vary by state, a self-implementing treaty to one party may require implementing legislation by another. Typically, however, self-implementing

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regarding the significant limitation upon sinks (credits for land use practices which actually remove GHGs from the atmosphere), simply not visible to the naked eye when reading the relevant Kyoto title (Article 3). The EU implausibly insisted that parties intended the language that sinks "shall be used to meet the commitments under this article" really only intended allowance for insignificant sink credits. Given the U.S. intended to meet a major portion of its Kyoto commitment through sinks, this initiated the beginning of the (temporary?) "end" of full-fledged U.S. participation in Kyoto talks.

[113] See "Submission", supra, for discussion of the necessity of communicating a treaty to the Senate, or whether the Executive's signature is sufficient justification for the Court to assert the Senate's ability to ratify the document

[114] See the UN's "Model Instrument for Ratification", at http://untreaty.un.org/English/TreatyHandbook/ annex4.htm.

[115] "Implementation The executive branch has the primary responsibility for carrying out treaties and ascertaining that other parties fulfill their obligations after treaties and other international agreements enter into force, but the Senate or the entire Congress share in the following phases." "Treaties and Other International Agreements: The Role of the U.S. Senate", p. 12. "A question that may be raised under U.S. law is whether or not Congress has a duty to implement a treaty which is in force internationally, but which requires additional legislation or implementation or an appropriation of funds to give effect to obligations assumed internationally by the United States. When implementation of a treaty requires domestic legislation or an appropriation of funds, only the Congress can provide them." Id. at pp. 166–67. Despite no specific implementing legislation, however, the Senate has indeed appropriated funds in pursuit of administrative programs seeking to advance Rio's objectives.

The FRC Report continues, "The extent of congressional obligation to implement a treaty under U.S. law has not been resolved in principle. FN 61 According to an often-cited authority, Congress has generally responded 'to a sense of duty to carry out what the treaty-makers promised, to a reluctance to defy and confront the President (especially after he can no longer retreat), to an unwillingness to make the U.S. system appear undependable, even ludicrous . . .'" Id. at 167, quoting Henkin, Louis. Foreign Affairs and the United States Constitution. 2d ed. 1996, pp. 205–206. The referenced FN 61 says in pertinent part, "[F]ailure to implement an internationally perfected treaty would constitute a violation of obligations assumed by the United States under international law. See Memorandum of April 12, 1976, by Monroe Leigh, Legal Adviser, Department of State, as quoted in U.S. Department of State. Digest of U.S. Practice in International Law 1976. 1977, p. 221." This begs the question: "to precisely what extent was the "non-binding" Rio binding?"

Addressing this question prior to ratification, "[t]he [Senate Foreign Relations] Committee made clear, in other words, its view that '[t]he final framework convention contains no legally binding commitments to reduce greenhouse gas emissions' . . . While these statements may not be as legally binding as a formal condition to the Senate's ratification of the 1992 Convention [ed: reservations were prohibited by Rio's terms], it is doubtful that any administration could ignore them." "Global Climate Change: Selected Legal Questions about the Kyoto Protocol", p. 4. CRS Report for Congress (March 29, 2001), citing in part 138 CONG. REC. 33521 (Oct. 7, 1992)(statement of Sen. McConnell).

To avoid future such uncertainty, in S.Res. 98 the Senate "stated the view that any agreement which would require Senate advice and consent should be accompanied by a detailed analysis of its economic impact and of any legislation and regulations necessary to implement the agreement." See CRS Report at p. 6, FN 25.

treaties provide reporting and accounting functions generally available to any relevant regulatory or administrative body.

An example of a self-ratifying treaty is the Rasmar Convention, or Convention on Wetlands of International Importance Especially as Waterfowl Habitats.[116]

The Convention requires no implementing legislation as it merely requires maintenance of a list of wetlands of international importance and encourages "wise use" of wetlands in order to preserve the ecological characteristics from which wetland values derive. The required function(s) can be effected under existing regulatory and/or administrative authority, in this case the task is merely the U.S. Fish and Wildlife Service serving as an administrative authority, in consultation with the Department of State.[117]

The Kyoto Protocol, however, is an entirely different story. Even in theory it is highly suspect that Kyoto could possibly proceed without implementing legislation. This because for the U.S. to achieve its obligations realistically requires significant reduction in emissions from energy use. The former, emissions, are for the most part not considered "pollutants" and therefore not regulated; the latter, actual energy use, is not regulated in any governmental sense but by market forces. Kyoto reductions would in fact require a massive series of initiatives to implement its regime, from emissions limitations and myriad tax provisions to internal versions of, inter alia, the international verification and trading infrastructures. That maze is illustrative of a treaty that is decidedly not self-implementing.

Withdrawal

The U.S. Constitution is silent as to the process for treaty withdrawal. Treaties provide their own provisions for withdrawal from their commitments. Kyoto's procedure, for example, is set forth in Article 27, as follows:

"1. At any time after 3 years from the date on which this Protocol has entered into force for a Party, that Party may withdraw from this Protocol by giving written notification to the Depositary.

2. Any such withdrawal shall take effect upon expiry of 1 year from the date of receipt by the Depositary of the notification of withdrawal, or on such later date as may be specified in the notification of withdrawal.

3. Any Party that withdraws from the Convention shall be considered as also having withdrawn from this Protocol."

Clearly, Senate ratification of a treaty that includes a withdrawal mechanism should resolve the question of the legitimacy of an executive acting pursuant to such mechanism. Though withdrawal can be politically contentious, little controversy appears likely over the actual process of withdrawal from treaties in-effect.[118]

That focused upon in this paper, however, is the curious, topical matter of withdrawing from agreements not ratified because of the possibility of obligations arising from pre-ratification commitments.[119] The treaty may merely be signed, and not transmitted to the Senate. The document may have been transmitted but not yet taken up. As discussed in "Submission", supra, that transmittal may or may not

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[116] I.L.M. 11:963–976; September 1972. This Convention entered force on December 21, 1975, after the required signatures of seven countries. The U.S. Senate consented to ratification of the Convention on October 9, 1986, and the President signed instruments of ratification on November 10, 1986.

[117] See http://laws.fws.gov/lawsdigest/treaty.html#list.

[118] Yet this is not the case, be the treaty in effect or otherwise. "Domestically, the Constitution does not prescribe a process for the United States to terminate a treaty, and the process remains controversial. Treaties have been terminated in a variety of ways, including by the President following a joint resolution of Congress, by the President following action by the Senate, by the President and with subsequent congressional or Senate approval, and by the President alone." "Treaties and Other International Agreements," at 14.

Regarding ABM, controversy exists in that numerous Members of Congress have filed suit against President Bush's invocation of the withdrawal provision in the anti-ballistic missile (ABM) treaty, signed with the now-defunct Soviet Union. See also S. 1565 (107th), proposed Senate resolution of disapproval.

[119] There is also little room to dispute that an "agreed to" treaty as yet unsigned requires no withdrawal, given that even the "troublemaking" provision Vienna 18, is triggered by the signature, not some even less formal level of "commitment". Specifically: "A State is obliged to refrain from acts which would defeat the object and purpose of a treaty when (a) it has signed the treaty or has exchanged instruments constituting the treaty subject to ratification, acceptance or approval . . ." The canon expressio unius est exclusio alterius would indicate that "commitments" begin with the signature. Also, the pre-signature, "agreement" stage as in the 1997 Kyoto "agreement" likely does not rise to the level of "exchanging documents." See the canons noscitur a sociis and ejusdem generis.

matter. Finally, a treaty may have been taken up for Senate consideration, but failed to achieve the requisite two-thirds vote.[120]

Kyoto's sole relevant provision addresses only a treaty having entered into force and offers no guidance as to how a state extracts itself from whatever commitments are incurred through signature.[121] This is seemingly true with the Vienna Convention's numerous relevant Articles (54—72), though those seem arguably susceptible to claims that they translate at minimum in spirit to state efforts to "[make] its intention clear not to become a party to the treaty".

The UNFCCC ought to serve as an authority on this issue, but, curiously, the same UNFCCC correspondence to the author regarding the U.S. status re: Kyoto, cited in FN 19, supra, also asserted: "There is no procedure for the withdrawal of a signature in the [UNFCCC or Kyoto]." A follow-up request as to whether this indicates the UNFCCC does not recognize the Vienna Convention has gone unanswered to date.

We can be confident that, at least in the case of the U.S., the Vienna Article 18 requirement is not satisfied by senior officers merely speaking ill of a treaty.[122]

As regards the never ratified, never transmitted Kyoto (or Rome), President Bush's badmouthing of the treaty, though he may clearly still reject it, would not be considered to constitute rejection by "denunciation." The U.S. continues to send delegations to the relevant negotiations, though in a strange, voluntarily mitigated role that is a matter of some controversy.[123] Kyoto provides for "observers" in Article 15: "2. Parties to the Convention that are not Parties to this Protocol may participate as observers in the proceedings of any session of the subsidiary bodies. When the subsidiary bodies serve as the subsidiary bodies of this Protocol, decisions under this Protocol shall be taken only by those that are Parties to this Protocol." It is this provision the Administration seems to believe it is invoking by attending negotiations in full force, but in a somewhat "backbench" role.[124]

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[120] Does the latter circumstance satisfy the Vienna test of making "its intention clear not to become a party to the treaty"? This is a fascinating question given that "(6) Treaties Reported by the [Foreign Relations] Committee but neither approved nor formally returned to the President by the Senate are automatically returned to the Committee calendar at the end of a Congress; the Committee must report them out again for the Senate to consider them." Therefore, a "defeated" treaty is not necessarily rejected until it is returned to the President. See "Treaties and Other International Agreements: The Role of the U.S. Senate", p. 12, at http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=106—cong—senate—print&docid=f:66922.pdf.

[121] For an example of withdrawal from a treaty in effect, see U.S. termination of recognition of compulsory jurisdiction of the International Court of Justice Treaty Series, vol. l, p. 9.

[122] Vienna does permit rejection or withdrawal, if not elsewhere provided otherwise and only under certain conditions, by "denunciation." See, e.g., Articles 42–44, 56, etc. However, that appears to be a term of art applicable only to executives with unilateral power to effect a treaty. Clearly, given the discussion above, that does not by itself seem to exclude the U.S. and its own system's peculiarities, when a treaty has yet to be ratified. Still, President Bush's precedent regarding Rome has established how the U.S. expresses its rejection. Mere badmouthing can reasonably be viewed as a negotiating ploy for a better offer.

[123] One reason provided by the Bush Administration, publicly if informally for the U.S. not having submitted any communication to the UNFCCC indicating its intent to not be bound by Kyoto is that the U.S. must remain a part of "the Kyoto process". There is no "Kyoto process," however, until the treaty achieves sufficient ratification to go into effect. Until that time, these negotiations remain part of the Rio Process (e.g., Kyoto emerged not from COP–1, or a Kyoto process, but COP–3, of the Rio Process pursuant to Rio Article 7). The U.S. delegation now assumes a second-class citizen posture, communicating desires through a proxy nation (typically Canada, one of the "umbrella group" nations; other such groups are the EU, the G–77 and China, etc.). This seems a wasted exercise as until Kyoto goes into effect, as a ratifying party to Rio the U.S. has every right to actively participate in the current round of COPs. This is another example of how protocol, or the desire to not upset other parties, dominates treaty process more than legal requirements.

[124] The Administration are likely incorrect. Specifically, the U.S. is informally spreading the word that because it has not ratified Kyoto it is not a "Party", but thereby eligible for Article 15 "observer" status. Yet it is clear that "Party" status originated with the agreement to Kyoto's terms at the close of COP–3. Specifically, Kyoto's own language belies a claim that until Kyoto is made effective by sufficient ratifications there are no "Parties" to the agreement.

The relevant provisions include, but are in no way limited to, the following: a) Kyoto's preamble prior to its articles states "The Parties to this Protocol . . . Have agreed as follows: [Articles] . . .", dated December 1997 and setting forth articles clearly reading in the present tense, and not as if relevant solely upon ratification; b) Articles 6.2, 7.4, 16, 18 and 20, among others, all reference activities which to the extent they have been addressed in the days since COP–3 manifest that it is "Parties"—to the Protocol, not the UNFCCC—who have been deliberating since; c) Article 13.2 makes clear that any decisions made regarding further narrowing of the Kyoto language, subsequent to COP–3, were made by Parties to the Protocol; and d) Article 13.7 appears to set forth the mechanism by which COP–6.5 (Bonn) was called and particularly timed, at the request of a Party to Kyoto.

Instead, withdrawal from a treaty (in effect) sufficient to satisfy Vienna is accomplished by communicating this intent to the other parties to the treaty.[125] As regards the unratified Rome Treaty, President Bush doubtless satisfied the relevant requirement by submitting an instrument rescinding the signature to the same body to which the signature was communicated. Regarding such treaties, however, until such communication, any nation is free to pursue an action seeking to have, for example, either the Bush energy plan calling for the construction of more coal-fired power plants, or its "Climate Action" proposal allowing increased greenhouse gas emissions, for they clearly violate Kyoto's "object and purpose".[126]

Finally, reconsider the Geneva Convention Protocol I. President Reagan transmitted a statement to the Senate whereby he did not send the language and ask for an unsuccessful vote on ratification, but asked for an "expression of the sense of the Senate" that it shared his disapproving view of the agreement. This appears to be a mere semantic distinction, but by so doing President Reagan performed a burden shift, establishing by precedent a position on which very few hard and fast rules govern. This transmittal intimated that the treaty was purely in the Senate's realm upon Executive signature, when in fact it is likely in the province of either the Executive or the Senate at this point to act.

CONCLUSION

The Kyoto Protocol, and its predecessor the Rio Treaty, offer an excellent example of the distorted modern application of the Treaty Power. This article intends to expose the impropriety of the U.S. agreeing to amend the U.N. Framework Convention on Climate Change (UNFCC, or Rio Treaty), by ratifying the Kyoto Protocol.

For whatever specific reasons (economic growth, failure to foresee the energy requirements of the "new economy", or other), the U.S., like many nations, failed to meet its voluntary Rio targets.[127]

Now some advocates assert, "Because the U.S. has not met its Rio goal, we must commit to even greater mandatory reductions (Kyoto)". Attempting instead to comply with the initial treaty seems the more appropriate response, for several reasons.

Rio went into force in March 1994. President Clinton did not request, nor did Congress enact, independent legislation implementing Rio, which was not an inherently self-executing treaty.[128] Authority and precedent make clear that responsibility for proposing such programs lies with the White House.[129] If our "non-binding" Rio obli-

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In sum, it takes remarkable creativity to contend under the language of Kyoto that no Parties to Kyoto exist until sufficient ratifications to bring Kyoto into effect have been submitted to the Directorate.

[125] See Vienna Article 67.

[126] Further, would the U.S. extending, or even permitting the continued application of, oil and gas depletion allowances (tax breaks facilitating lower-priced energy) also constitute a violation of Vienna via Kyoto? If so, how about recently extended state subsidies for the German coal industry, a nation which subsequently ratified Kyoto?

[127] See, e.g., http://unfccc.int/resource/docs/natc/eunc3.pdf. The EU, which under Kyoto has negotiated a "bubble" such that it could pool its increases and "reductions", announced in May that it met its Rio target. It said it had reduced greenhouse gases by 3.5 percent below 1990 levels in 2000. This is commonly attributed to the ending of coal subsidies in Great Britain in their push to replace coal with gas, shutting down East German industry and that Europe did not match the U.S.' decade-long economic expansion. Russia, e.g., met its target by regressing economically.

[128] As the party charged with "making" treaties the Executive is responsible for meeting, or at minimum proposing legislation to affect, treaty commitments. President Clinton proposed a Btu tax, though not expressly in pursuit of Rio. It failed once and did not emerge again. He instituted his Climate Action Plan, which with minor recent modifications continues to this day with more than 50 voluntary programs, though a quick search of Thomas revealed no implementing legislation. Congress did appropriate money in response to proposals by the Executive. See, e.g., "Treaties and Other International Agreements: The Role of the U.S. Senate", S. Rpt. 106–71, p.4.

[129] "Implementation The executive branch has the primary responsibility for carrying out treaties and ascertaining that other parties fulfill their obligations after treaties and other international agreements enter into force, but the Senate or the entire Congress share in the following phases." "Treaties and Other International Agreements", p. 12. "A question that may be raised under U.S. law is whether or not Congress has a duty to implement a treaty which is in force internationally, but which requires additional legislation or implementation or an appropriation of funds to give effect to obligations assumed internationally by the United States. When implementation of a treaty requires domestic legislation or an appropriation of funds, only the Congress can provide them." Id. at pp. 166–67.

The FRC Report continues, "The extent of congressional obligation to implement a treaty under U.S. law has not been resolved in principle. FN 61 According to an often-cited authority, Congress has generally responded 'to a sense of duty to carry out what the treaty-makers prom-

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gations in fact "bound" the U.S. to achieve specific reductions[130]—contrary to contemporary Senate and Executive assertions of U.S. intent—then the Executive interpretation of Rio Article 4 throughout the 1990's was actually incorrect, and is responsible. The pending question is apparently: does the U.S. respond by attempting to meet such Rio promises, or by making further, even deeper, binding promises?

Skipping specific pursuit of the U.S.' Rio promises, in favor of Kyoto's binding commitments even greater than those we've failed to attain, seems highly illogical. Compounding this of course is that, precisely 5 years ago tomorrow, the Senate unanimously spoke to what it recognized was an unacceptable drift away from the U.S. Rio stance adamantly opposed to binding commitments. The Senate, seeing what was developing, asserted its "Advice" pursuant to Article II, Section 2 of the U.S. Constitution, passing S. Res. 98.[131]

Subsequent to and despite this Advice, U.S. negotiators clearly disregarded both major Byrd-Hagel recommendations: Kyoto did not require developing countries to share our commitments, and even the Clinton White House economic advisors have recanted their refutations of the Kyoto cost estimates.[132]

Since then, nothing has emerged to indicate that Kyoto does not still violate both key Byrd-Hagel conditions, and it is likely that very few Senators have amended their position against a treaty causing "serious economic harm." However, Clinton Administration officials did admit that they began working on the plan for binding commitments within 1 year after Rio went into effect.[133]

Kyoto, too, is clearly intended to be a similar step in a "treaty hopping" campaign: even the models on which it is based predict an undetectable climatic impact[134]—

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ised, to a reluctance to defy and confront the President (especially after he can no longer retreat), to an unwillingness to make the U.S. system appear undependable, even ludicrous . . .'" Id. at 167, quoting Henkin, Louis. Foreign Affairs and the United States Constitution. 2d ed. 1996, pp. 205–206. The referenced FN 61 says in pertinent part, "[F]ailure to implement an internationally perfected treaty would constitute a violation of obligations assumed by the United States under international law. See Memorandum of April 12, 1976, by Monroe Leigh, Legal Adviser, Department of State, as quoted in U.S. Department of State. Digest of U.S. Practice in International Law 1976. 1977, p. 221." This begs the question: "to precisely what extent was the "non-binding" Rio binding?

[130] Addressing the question, above (FN 5), prior to ratification, "[t]he [Senate Foreign Relations] Committee made clear, in other words, its view that '[t]he final framework convention contains no legally binding commitments to reduce greenhouse gas emissions' . . . While these statements may not be as legally binding as a formal condition to the Senate's ratification of the 1992 Convention [ed: reservations were prohibited by Rio's terms], it is doubtful that any administration could ignore them." "Global Climate Change: Selected Legal Questions about the Kyoto Protocol", p. 4. CRS Report for Congress (March 29, 2001), citing in part 138 CONG. REC. 33521 (Oct. 7, 1992)(statement of Sen. McConnell).

To avoid future such uncertainty, in S.Res. 98 (105th Cong., 1st Sess., adopted at 143 CONG. REC. S 8138 (daily ed. July 25, 1997)), the Senate "stated the view that any agreement which would require Senate advice and consent should be accompanied by a detailed analysis of its economic impact and of any legislation and regulations necessary to implement the agreement." See CRS Report at p. 6, FN 25.

[131] "In mid–1997, as these negotiations were underway, the Senate passed S. Res. 98 [ed.: "Byrd-Hagel," S.Res. 98 105th Congress (105–54 July 21, 1997)], which stated that the Senate would not approve any agreement on binding reductions in greenhouse gases that did not include commitments by developing countries as well as developed/industrialized countries, or that would result in harm to the U.S. economy. The administration has not transmitted the Kyoto Protocol to the Senate because, among other reasons, developing countries have to date not been willing to consider making binding commitments regarding their greenhouse gas emissions." "Treaties and Other International Agreements", p. 276.

The operative language is as follows: "Resolved, That it is the sense of the Senate that——

(1) the United States should not be a signatory to any protocol to, or other agreement regarding, the United Nations Framework Convention on Climate Change of 1992, at negotiations in Kyoto in December 1997, or thereafter, which would——

(A) mandate new commitments to limit or reduce greenhouse gas emissions for the Annex I Parties, unless the protocol or other agreement also mandates new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the same compliance period, or

(B) would result in serious harm to the economy of the United States".

[132] "Economists from the Clinton White House now concede that complying with Kyoto's mandatory reductions in greenhouse gases would be difficult—and more expensive to American consumers than they thought when they were in charge." USA Today, 12 June 2001.

[133] In 1996, Deputy Assistant Secretary of State Rafe Pomerance asserted that "the administration has been working on this policy for more than a year", quoted in Nature, 25 July 1996.

[134] See, Testimony of Dr. Sallie Baliunas to the Senate Committee on Environment and Public Works, at http://www.techcentralstation.com/1051/envirowrapper.jsp?PID=1051–450&CID=1051–031302C.

at a cost to the U.S. of up to $400 billion annually[135]—yet may be 1/30th of what its proponents seek.[136] Rio and Kyoto offer differing commitments but purport "the same ultimate objective."[137] The U.N. IPCC has said this means reducing GHG emissions by as much as 60–80 percent, which wildly exceeds Kyoto's specified ambitions.

As such the U.S. should require, prior to and as part of ratifying any further agreements, express acknowledgement not only of the actual "ultimate goal", but that it is committed to its practical requirements, in this case up to "30 Kyotos".

Such "treaty hopping" agendas illustrate the importance of Senate treaty "reservations", or the Senate's second bite at the "Advice" apple. This comes of course during the "Consent" function, which function the U.S. negotiators unfortunately eviscerated. After agreeing to terms incompatible with Byrd-Hagel, the Administration also accepted Kyoto's prohibition on reservations, or the Senate's ability to specify the specific understandings or conditions of the U.S. commitment. This despite the Senate also having forewarned the administration about this in advance of Kyoto.[138]

In summation, President Bush ought to match his assertions of having "rejected" Kyoto with the requisite submission to the U.N. to that effect, as was done regarding the International Criminal Court.[139] In the absence of that act, the White House must at minimum assist resolution of the ambiguous U.S. role in Kyoto by requesting the Senate disapprove of the treaty. In the absence of that, the Senate should recognize that there is no reverse equivalent of the "presentment" clause[140], regarding treaties. Only protocol, not any constitutional prohibition, impedes Senate consideration of a signed treaty. Certainly given the imperative rhetoric surrounding Kyoto, if President Bush insists on continuing the U.S.' ambiguous role the Senate should take matters into its own hands, and decide the fate of this agreement.

That resolution should by definition be rejection of Kyoto. Otherwise, by accepting this double indignity of ignoring advice and prohibiting reservations, this body would condone Executive circumvention of the Senate's constitutional treaty role.

STATEMENT OF JON REISMAN, ASSOCIATE PROFESSOR OF ECONOMICS AND PUBLIC POLICY, UNIVERSITY OF MAINE AT MACHIAS

I would like to call the attention of the Committees on Foreign Relations and Environment and Public Works to a troubling development in New England, where all six New England Governors (NEG) have entered into an unconstitutional agreement with the Eastern Canadian Premiers (ECP) to implement the Kyoto Protocol's caps on carbon dioxide (CO_2) emissions. [1]

In my view, the NEG/ECP climate change agreement:

- Violates Article 1, Section 10 of the Constitution: "No State shall enter into any Treaty, Alliance or Confederation . . . No State shall, without the Consent of

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[135] U.S. Department of Energy, Energy Information Administration, Office of Integrated Analysis and Forecasting. "Impacts of the Kyoto Protocol on U.S. Energy markets and Economic Activity." Washington, DC. October 1998.

[136] "Yet the climate simulations lead to the conclusion that the Kyoto reductions will have little effect in the twenty-first century (15), and 1930 Kyotos' may be needed to reduce warming to an acceptable level.' James Hansen, Makiko Sato, Reto Ruedy, Andrew Lacis, and Valdar Oinas, "Global warming in the twenty-first century: An alternative scenario," Proceeding of the National Academy of Sciences, August 29, 2000.

Hansen was citing Malakoff, D. (1997) Science 278, 2048.

[137] "[S]tabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." See, e.g., Rio Article 2.

[138] See "Treaties and Other International Agreements," at 274.

[139] The President manifested that this is how the United States makes "its intention clear to not become a party to the treaty," as required by "customary" law and the Vienna Convention Article 18. "[S]ignature by the U.S. does impose an obligation on the U.S. under international law to refrain from actions that would undermine the Protocol's object and purpose. That obligation continues to apply until such time as the U.S. ratifies the Protocol or makes clear its intent not to do so." "Global Climate Change: Selected Legal Questions about the Kyoto Protocol", CRS Report for Congress (March 29, 2001).

[140] U.S. Constitution, Article I, Section 7: "Every Bill which shall have passed the House of Representatives and the Senate, shall, before it become a Law, be presented to the President of the United States".

Though it has not yet done so, precedent indicates the Senate can also effect this outcome by passing a Sense of the Senate expressing disapproval of a signed, not ratified treaty. See, "Withdrawal," in attached article.

[1]Committee on the Environment and the Northeast International Committee on Energy of the Conference of New England Governors and Eastern Canadian Premiers, Climate Change Action Plan 2001. http://www.scics.gc.ca/pdf/850084011—e.pdf

Congress . . . enter into any Agreement or Compact with another State, or with a foreign Power . . ." and

• Seeks to implement the Kyoto Protocol before the U.S. Senate has ratified it, and when, in fact, it has been rejected explicitly by the President and implicitly by the terms of Senate Resolution No. 98 by a vote of 95–0.

The NEG/ECP climate change agreement is a transparent attempt to implement the Kyoto Protocol, without reference to the complex terms of the Protocol itself. It calls for reducing greenhouse gas emissions to 1990 levels by 2010 and to 10 percent below 1990 levels by 2020. This level of reduction substantially exceeds the 7 percent reduction target that the United States would need to meet by 2008–2012 under the Kyoto agreement.

Action steps under the NEG/ECP climate agreement include:

1) establishing a regional, standardized greenhouse gas emissions inventory and emissions reduction plan;

2) "educating" the public about the "problem, causes and solutions" of global warming;

3) decreasing emissions from the electricity and transportation sectors, and

4) creating a regional registry and emissions trading mechanism.

The New England Governors are scheduled to travel to Quebec this August and likely will sign an agreement with the Eastern Canadian Premiers to begin implementing the unconstitutional pledge they made last year.[2] This year, they intend to work out specific goals and implementation schemes.

There is settled precedent supporting the position that the NEG/ECP climate agreement violates the U.S. Constitution. In Holmes v. Jennison, Chief Justice Taney emphasized the broad intent of the framers underlying Section 10:

"As these words ('agreement or compact') could not have been idly or superfluously used by the framers of the Constitution, they cannot be construed to mean the same thing with the word treaty. They evidently mean something more, and were designed to make the prohibition more comprehensive. . . . The word 'agreement' does not necessarily import and direct any express stipulation; nor is it necessary that it should be in writing. . . .

"And the use of all of these terms, 'treaty,' 'agreement,' 'compact,' show that it was the intention of the framers of the Constitution to use the broadest and most comprehensive terms; and that they anxiously desired to cutoff all connection or communication between a State and a foreign power; and we shall fail to execute that evident intention, unless we give to the word 'agreement' its most extended signification; and so apply it as to prohibit every agreement, written or verbal, formal or informal, positive or implied, by the mutual understanding of the parties." 14 Pet. (39 U.S.) 540, 570–572 (1840).

In addition to these legal concerns, the policy wisdom of implementing Kyoto may certainly be debated in the face of the National Academy of Sciences' recent finding that anthropogenic vs. natural causality is still clouded by considerable uncertainty[3]. Correlation is not causation, and the atmospheric models that global warming advocates rely upon predict that the upper atmosphere will warm first, something that has not happened and is still unexplained. Furthermore, those same flawed models predict that the reductions in CO_2 envisioned in Kyoto will essentially have no effect on climate[4].

The Committee on Foreign Relations should hold a separate inquiry on the purpose and Constitutional legitimacy of the NEG/ECP climate change agreement. Allowing six New England States to move forward to implement the Kyoto Protocol would support the proposition that States are free to ignore Article 1, Section 10, and are at liberty to negotiate and implement international agreements without the advice and consent of the U.S. Senate.

These concerns are far from academic. Suppose, for example, that Vermont had disagreed with the Senate's rejection of the League of Nations, and had recognized and joined that entity? Article 1, Section 10 exists precisely to avoid such situations.

If the Environment and Public Works Committee supports the efforts of New England's Governors, it should introduce legislation to implement Kyoto's caps on a nationwide basis, and let that legislation be fully debated on the floor of the Senate. There is absolutely no defensible environmental or economic rationale for piecemeal regional implementation of an international agreement that fails, by its terms, to address future emissions growth by rapidly growing developing nations such as

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[2]News summary of the 2001 meeting at http://www.edie.net/news/Archive/4632.cfm

[3]National Academy of Sciences. Climate Change Science: An Analysis of Some Key Questions (2001) http://books.nap.edu/books/0309075742/html/

[4]Testimony of Dr. Sallie Baliunas to the Senate Committee on Environment and Public Works http://www.techcentralstation.com/1051/envirowrapper.jsp?PID=1051–450&CID=1051–031302C

China and India. Implementing Kyoto targets on a regional basis would lead only to competitive disadvantage, lost wages and jobs, and larger State budget deficits at a time of increasing economic uncertainty.

I hope that the Committees will join me in urging the Administration to notify the New England Governors that the United States Constitution still applies in New England, even on environmental matters. We have not, as yet, dispensed with the formality of having the President negotiate and the Senate ratify international agreements before we implement them. States are proscribed from making foreign or interstate agreements. That Constitutional principle is at risk here.

Jon Reisman is an associate professor of economics and public policy at the University of Maine at Machias, where he teaches a variety of courses including Environmental Policy and Political Correctness in American Society. He has a B.A. in economics and environmental studies from Colby College, an M.A. in economics from Brown University and an M.A. in public policy and management from the University of Southern Maine.

Reisman worked for Gov. Angus King in 1995 getting rid of federally mandated car testing in Maine. Upon returning to rural Downeast Maine, he led the effort opposing the endangered species listing of Atlantic salmon. In 1998 he was the GOP nominee in Maine's 2d congressional district.

Reisman pioneered an innovative course offering, "Political Correctness in American Society" at the University of Maine at Machias. The course is now offered on the web. Reisman's home page is http://www.umm.maine.edu/faculty/jreisman/jreisman.html

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SYNTHESIS

(by John C. Dernbach)

In June 1992, at the United Nations Conference on Environment and Development (UNCED, or Earth Summit) in Rio de Janeiro, the nations of the world agreed to implement an ambitious plan for sustainable development. The United States was one of those countries. Has the United States moved toward or away from sustainable development in the 10-year period since Rio? What should the country do next? The book has sought to answer both questions.

Sustainable development is ecologically sustainable human development; it includes but is not limited to economic development. Sustainable development affirms the basic goals of development since the end of World War II, but changes them in one key way. Development is based on peace, economic development, social betterment, and effective national governance. Its goals are human freedom, opportunity, and quality of life, and it has succeeded in many ways.

Unfortunately, we now face growing environmental degradation around the world, and a growing gap between rich and poor. Increasingly, these problems undermine and hinder traditional methods of economic and social development. Deforestation and overfishing mean that many people and businesses can no longer earn a livelihood. Pollution impairs human health and thus human betterment. Conflicts over water and other resources lead to violence and civil strife. These and other problems are profoundly destabilizing because they mean less freedom and opportunity and lower quality of life.

Sustainable development responds to these problems by adding environmental protection to the goals of traditional development. Instead of development at the environment's expense, or environmental protection at the expense of development, sustainable development would achieve both traditional development and environmental protection or restoration at the same time. Sustainable development affirms the importance of freedom, opportunity, and quality of life, for both present and future generations.

Sustainable development should matter to the United States because freedom, opportunity, and quality of life are among our core goals as a Nation. Providing a better life for those who come after us is also a basic American value. Sustainable development would lead to a stronger, more efficient, and more productive America, because this country's economic, environmental, social, and security goals would support each other in greater and greater degrees over time, rather than undermine one another. Sustainable development would also both require and promote effective governance and legal systems, which Americans also value. By addressing the destabilizing effects of poverty and environmental degradation around the world, the United States could help make the world more secure. In addition, U.S. economic

and military power, as well as the ethical and religious foundations for sustainability, suggest a special obligation to work for sustainable development.

The United States has, unquestionably, begun to take some steps toward sustainable development. In fact, those who see sustainable development as including prior and ongoing efforts, such as conservation and pollution control, could rightly say that the 1990's saw a continuation of activities that began before the Earth Summit. Yet, on balance, the United States is now far from being a sustainable society, and in many respects is farther away than it was in 1992.

While there is "good news" and "bad news" to report, the bad news is told in general trends, broad studies, and for entire economic sectors or program areas. All too frequently, the good news is limited to specific examples and particular programs. The United States has not responded in a way that corresponds to the seriousness of the problems we face or to the opportunities provided by sustainable development. Nevertheless, legal and policy tools are available to put the United States on a direct path to sustainability, to our great advantage and without major dislocations-if we can muster the will and the vision to use them.

This synthesis begins with an overview of the book's findings and recommendations, followed by an explanation of sustainable development and its importance to the United States. It then summarizes each of the book's major sections, which concern consumption and population; international trade, finance, and development assistance; conservation and management of natural resources; waste and toxic chemicals; education; institutions and infrastructure; and governance. Throughout, the synthesis summarizes and often excerpts from individual chapters.

OVERVIEW

A Little Good News

In virtually every area of American life, a few people and organizations are exercising leadership for sustainability. A small number of Federal agencies, State governments, local governments, corporations, universities, and others have taken a leadership role in moving toward sustainable development over the past decade. Nearly all of these efforts contain room for improvement. Still, they demonstrate that it is both possible and desirable to reconcile environmental, social, and economic goals. For instance:

The Federal Government greatly expanded its use of habitat conservation plans in the past decade to reconcile conflicts between economic development and endangered species protection. A few States have begun to implement strategies for sustainable development and use indicators for sustainability.

At the community level, some sustainability initiatives have been undertaken, and are yielding some positive results.

A handful of major corporations are seriously embracing the "triple bottom line" of environment, economy, and society or equity as a way of setting and achieving goals. A small minority of primary schools, high schools, and higher education institutions are teaching students to perform the kind of integrated and interdisciplinary analysis needed to make decisions that simultaneously further social, economic, and environmental goals.

In a few areas, the United States has played a significant and constructive international leadership role. These include the protection of high seas fisheries, the prevention of lead poisoning, integration of environmental considerations into trade agreements, and incorporation of environmental impact reviews and public participation in World Bank projects.

The President's Council on Sustainable Development (PCSD), an advisory council that existed between 1993 and 1999, developed hundreds of recommendations that would foster national security, economic development, job creation, and environmental protection at the same time. The PCSD and others outlined a policy framework showing that the United States actually could make significant progress toward sustainable development.

There is much better information about many environmental problems now than there was 10 years ago, and generally greater access to it. We also have a much better idea of the steps needed to achieve sustainable development, and have made significant progress in creating the policy and legal tools necessary to do so.

A Lot of Bad News

Energy and materials consumption grew substantially in the past decade, and reduced or outweighed many specific environmental achievements. With 5 percent of the world's population, the United States was at the time of the Earth Summit responsible for about 24 percent of the world's energy consumption and almost 30 percent of the world's raw materials consumption. Since the Earth Summit, materials

use has increased 10 percent, primary energy consumption has increased 21 percent, and energy-related carbon dioxide (CO_2) emissions have increased by 13 percent. Over and over, increases in materials and energy efficiency, and in the effectiveness of pollution controls for individual sources, are outweighed by increases in consumption. Despite a significant increase in municipal waste recycling in the past decade, for example, the U.S. generation and disposal of municipal solid waste per capita have been growing since 1996. U.S. population-the number of people consuming resources and energy-grew by 32.7 million, or 13.2 percent, from 1990 to 2000, the largest single decade of growth in the nation's history.

Moreover, the United States has not exercised the kind of international leadership necessary to encourage or support sustainable development around the world. The United States is not a Party to many treaties and international agreements that are intended to foster sustainable development in specific contexts, including the Convention on Biological Diversity and the Kyoto Protocol. Current patterns of international trade cause environmental harm and impair sustainable development in part because U.S. trade policy tends to put short-term domestic economic goals ahead of sustainable development. U.S. official development assistance has declined since Rio. Although the United States was the second largest provider of official development assistance in 2000, its contribution was the lowest of all industrialized countries, measured as a percentage of gross domestic income.

U.S. law and policy continue to encourage unsustainable development in a variety of ways. These include subsidies, "grandfather" provisions for existing and more-polluting facilities and activities in pollution control laws, and fragmented local decisionmaking that encourages sprawl. Such laws and policies mean that individuals and corporations have fewer choices, and less sustainable choices, than they would otherwise.

The United States has no national strategy for achieving sustainable development, and no generally accepted indicators to mark progress along the way. Nor does the United States have a meaningful or effective strategy to address climate change, biodiversity, and many other issues. Neither the executive branch nor the U.S. Congress systematically analyze proposed activities to find ways to make significant progress on economic, environmental, social, and security goals at the same time.

As a whole, the condition of America's natural resources and ecosystems has not improved, and appears to have deteriorated slightly, over the past decade. There was no discernible improvement in our rivers, streams, and lakes, and the quality of our ocean coastal waters appears to have deteriorated. Greenhouse gas (GHG) emissions increased, and a large number of plant and animal species continue to be at risk of extinction. U.S. agriculture is less sustainable, and urban sprawl continues relatively unabated. Air quality improved slightly, but not enough to fully protect human health.

The social and institutional infrastructure and supports needed for sustainable development continue to cause environmental degradation and underserve the poor. The negative environmental impacts of transportation increased during the past decade, despite significant legislative changes. The U.S. sanitation system remains vulnerable to breakdowns, the level of communicable diseases is high when compared to other developed countries, and there has been no discernible progress in improving access to medical care.

Recommendations for the Next Decade

The path to sustainability is not an easy one, but it is marked by basic American values. These include freedom, opportunity, and quality of life; greater efficiency; more effective and responsive governance; a desire to make a better world for those who follow us; a willingness to find and exploit opportunities; a quest for a safer world; and a sense of calling to play a constructive role in international affairs. All of these are underscored by our ethical and even religious obligations toward each other and the environment.

The United States would take a large and decisive step toward sustainability if individuals, businesses, educational institutions, local and State governments, Federal agencies and others would simply adopt and build on the leading sustainability practices of their counterparts here and in other nations.

A national strategy for sustainable development, with specified goals and priorities, would harness all sectors of society to achieve our economic, social, environmental, and security goals. The strategy could be modeled on that of the European Union (EU) and States such as New Jersey, and specifically address climate change, biodiversity, and other major issues. An executive-level entity would be needed to coordinate and assist in the implementation of the strategy. A counterpart entity in Congress would also be helpful. The strategy would more likely be effective if

there were a set of indicators to measure progress in achieving its goals. Comparable State and local strategies and indicators are also needed.

The United States needs to recognize that its substantial consumption levels, coupled with domestic population growth, have serious environmental, social, and economic impacts. Americans also need to understand that human well-being can be decoupled from high consumption of materials and energy. A shift in taxes from labor and income, on one hand, to materials and energy consumption, on the other, would encourage both greater efficiency and reduced negative environmental impacts.

Congress should repeal or modify laws, policies, and subsidies that encourage unsustainable development. The elimination of subsidies would also have positive budgetary impacts. The repeal or modification of such laws would provide more and better opportunities for individuals and corporations to act in a more sustainable manner, and would remove an important set of barriers to sustainability.

Protection of natural resources and the environment must focus more holistically on the resources to be protected, and on understanding those resources. Congress and the States need to assure that these resources are protected from all significant threats, and are protected from those threats to the same degree. In addition, the type of substantive goals that exist in the air and water pollution control programs, as well as supportive implementing mechanisms, should be applied to biodiversity, climate change, oceans under U.S. jurisdiction, forests, and other natural resources. The United States also needs to fund or support the development of more complete and reliable information about ecosystems as well as about the connections among its economic, environmental, social, and security goals.

Social infrastructure, institutions, and laws should be designed and operated to further economic, environmental, and social goals at the same time. Public health services and, at a minimum, basic medical services should be available to all. Transportation infrastructure should be more efficient and diverse, and provide people with more choices.

The United States needs to take a stronger and more constructive leadership role internationally, not only on terrorism but on the broad range of issues related to sustainable development. The United States should further increase its official development assistance, while taking measures to ensure that the money is spent effectively and for sustainable development. More broadly, U.S. foreign policy, including trade policy, needs to be more supportive of the development aspect of sustainable development. The United States should also become a Party to many of the international treaties that would foster sustainable development, including the Convention on Biological Diversity, the Cartagena Protocol on Biosafety, the Aarhus Convention on Access to Information, the Rotterdam Convention on Prior Informed Consent, the Stockholm Convention on Persistent Organic Pollutants, and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes.

Some longer term changes are also needed if the United States is to achieve sustainable development. They include the evolution of judicial understanding of property to update expectations about the productive value of ecosystems and the establishment of more inviting avenues for public participation in and challenge to decisions affecting sustainability.

What Is Sustainable Development?

Sustainable development is human development that is ecologically sustainable. Its aims are human freedom, opportunity, and higher quality of life. It is not another name for economic development, although it includes economic development.

Because "sustainable" modifies "development," it is first important to understand what development means. Although Americans understand development to mean the transformation of a field or woodlot into housing or a mall, development has a different meaning at the international level. Since the end of World War II, the United States and most of the world community have successfully sought greater peace and security, economic development, and social development or human rights. They have also sought national governance that supports these goals, even though they recognize that international efforts are also needed. As understood internationally, these are the four elements of development. This understanding of development grew out of the experiences of the last world war and the great depression that preceded and contributed to it, and a firm desire to ensure that the conditions that led to them would not occur again. More positively, development is intended to foster human freedom, opportunity, and quality of life.

For more than half a century, we have measured progress by the extent to which we have realized these goals. And there has been a great deal of progress. The world is more free, there is more opportunity, and most humans have a higher quality of life now than they did in 1945.

But until recently, protecting and restoring the environment was not among these goals. Indeed, progress in achieving these other goals was considered to outweigh or even justify any environmental degradation that may have occurred.

As the World Commission on Environment and Development concluded in 1987, progress in the past half century has come with a price we cannot ignore and can no longer afford-massive and growing environmental degradation, and a growing number of people in poverty. The commission concluded that countries should seek sustainable development-"development that meets the needs of the present without compromising the ability of future generations to meet their own needs." Sustainable development would thus meet human needs over the long term; the present generation would not benefit at the expense of future generations. When nations of the world endorsed sustainable development at the Earth Summit in 1992, they redefined progress to include environmental protection and restoration.

Sustainable development is based on a sober and realistic appraisal of how humans need to approach the problems of the next half century or more. Like traditional development, it is premised on a recognition of what can happen when freedom, opportunity, and quality of life are inequitably realized or are diminishing.

Every major international and regional report on the condition of the environment shows continuing and deteriorating environmental conditions. The gap between the rich and poor continues to grow. Poverty and environmental degradation are mutually reinforcing; poor people live in the most polluted or degraded environments, and this contributes to their poverty. Although poverty and environmental degradation are important in their own right, they also can cause or contribute to wars, starvation, ethnic tensions, and terrorism, which are more likely to get headlines than their underlying causes. Like terrorism, poverty and environmental degradation are destabilizing. The pressures caused by poverty and environmental degradation are likely to increase in the next half century. Global population is expected to grow from roughly six to nine billion, or 50 percent, by 2050. The global economy is likely to grow by a factor of three to five in the same period. As difficult and challenging as things now appear, they are likely to become much more difficult and challenging in the decades ahead.

Sustainable development also has deep ethical and religious roots. Sustainable development leads to two major shifts in ethical thinking and action. It recognizes the connections between humanity's social, ecological, and economic obligations, and it recognizes responsibility for future as well as present generations. Agenda 21, the blueprint for sustainable development adopted at the Earth Summit, thus calls for distributive justice, or a fair sharing of environmental resources by humans. The distributive justice theme was in response to demands by developing countries that they have the same right to use natural resources as developed countries. Agenda 21 also suggests that humans have a moral responsibility to limit activities that, if not curtailed or redirected, will severely degrade or even destroy ecosystems. Because human damage to the environment also hurts other humans, sustainable development recognizes the relationship between environmental protection and social justice.

The sacred texts and beliefs underlying the world's religions also support sustainable development, even if that has not been true of their practices. These religious traditions support appreciation for all life; human stewardship of creation; harmony among humans, their communities, and their environment; and a caring for place. They also indicate that the natural world is valuable in itself, not simply insofar as humans may value it. They articulate the importance of deep respect for creation, both human and nonhuman, and living in a manner that is ecologically sustainable. These texts and beliefs also indicate the importance of fair and equitable sharing of resources, which would mean both ceilings and floors for consumption. Finally, they suggest that people be given an opportunity to participate in decisions that will affect their lives and their communities.

To achieve sustainable development, nations at the Earth Summit endorsed two important but nonbinding texts, Agenda 21 and the Rio Declaration. (They also agreed to a separate set of principles for forestry.) As a global plan of action for sustainable development, Agenda 21 is intended to be carried out primarily, but not exclusively, by countries within their own borders. Agenda 21, which contains 40 separate chapters, runs several hundred pages regardless of how it is printed. These chapters focus on the social and economic dimensions of sustainable development, e.g., poverty, human health, and population; conservation and management of natural resources, e.g., atmosphere, forests, biological diversity, and various wastes and toxic chemicals; the role of major groups, e.g., children and youth, women, farmers, workers, and business and industry, in attaining sustainable development; and means of implementation, e.g., financial resources, technology transfer, science, education, and public information. Each chapter identifies specific actions to be taken,

explains generally why these actions are necessary, identifies the persons or institutions who are to take action, and describes specific means of implementation.

The Rio Declaration is a set of 27 principles for sustainable development. Key principles include the integration of environment and development in decision-making, sustainable patterns of resource production and consumption, the polluter-pays principle, the precautionary approach or principle, developed country leadership, intergenerational equity, and public participation. The polluter-pays principle would have polluters bear the costs of preventing and cleaning up environmental problems rather than impose the costs of those problems on others. According to the precautionary principle, the absence of complete scientific certainty about serious problems is not an excuse for refusing to take action. These principles also are woven into Agenda 21.

In Rio, the international community also established a process for reviewing national and international progress toward sustainable development. Agenda 21 has been, and continues to be, the focal point of that process.

When countries agreed to Agenda 21 and the Rio Declaration, they agreed to implement these agreements, both at home and in their foreign policy. The United States, under the leadership of President George H.W. Bush, was one of those countries.

Why Should Sustainable Development Matter to the United States?

Americans should care about sustainable development because its goals-human freedom, opportunity, and quality of life-are also our goals. We sought independence for these purposes, established a legal and economic system premised on their importance, endured a civil war to protect that system and expand its opportunities to others, and fought two world wars and numerous other conflicts to protect ourselves and help make those same opportunities available to others.

Sustainable development, moreover, is not just about us, the current generation of Americans. It is, in the U.S. Constitution's words, about "ourselves and our posterity," our children, grandchildren, nieces, nephews, and others not yet born who will someday inhabit this country. We pride ourselves on providing our descendants greater opportunities and a better quality of life. Sustainable development would do precisely that. Without it, we cannot assure our children and grandchildren a better life, and are likely to leave them a poorer one.

Sustainable development would lead to a stronger and more efficient America because we would be pursuing social, economic, environmental, and security goals in ways that are more mutually reinforcing or supportive over time, not contradictory or antagonistic. The result would be a stronger, more efficient country that provides its citizens and their descendants increasingly more opportunities in a quality natural environment. Increased energy efficiency would reduce energy costs for manufacturers and consumers, and would also mean reduced pollution. In addition to securing an ongoing supply of timber and paper products, sustainable forestry matters because we rely on forests for watershed maintenance, pollution abatement, climate control, jobs, and recreation. Similarly, a sustainable transportation system would make it easier, less expensive, and less environmentally damaging for people of all incomes to travel from home to work and other destinations. Cleaner production is likely to be less costly and more efficient, reduce the economic and social burdens created by human exposure to hazardous wastes and substances, and improve the occupational health and safety of workers.

Sustainable development would also lead to better and more responsive governance, which is another basic American value. Ensuring that our economic, social, environmental, and security goals are mutually supportive would require that the government does not subsidize with one hand what it controls on the other. It would also require more public involvement in many decisionmaking processes because public input is more likely to ensure that these goals are harmonized.

Sustainable development would also lead to a safer, more stable and secure world outside American borders. That would have important and positive consequences for both ourselves and others, particularly after September 11, 2001. The world is deeply divided between haves and have-nots, and the risk of evolution toward an unstable, two-class world, with a huge global underclass, is quite real. Americans have a large stake in the prevention or avoidance of humanitarian emergencies, national and regional conflicts, environmental deterioration, terrorism, illicit drugs, the spread of diseases, illegal migration, and other disasters. These threats to our security do not need passports to cross borders. None of the goals that this country has pursued around the world-peace and stability, human rights and democratization, expansion of trade and markets, environmental protection, or putting an end to hunger and extreme deprivation-can be accomplished effectively except in the context of sustainable development. Thus, while sustainable development assistance in

developing countries can be justified on humanitarian grounds, it is also consistent with the strategic interests of the United States.

Americans have a special role to play in sustainable development. We have the largest economy and the most powerful military in the world. Not only do we have enormous capability to bring to bear in the pursuit of sustainable development, we also bear a significant share of the responsibility for the global environmental problems that sustainable development is intended to address. The United States is the world's largest producer and consumer of materials and energy. Since the U.S. model of production and consumption is widely emulated throughout the world, U.S. domestic actions could also have a major international effect.

It is often said that nations or individuals can lead, follow, or get out of the way. The United States is in an unparalleled position to play a key international leadership role on sustainable development. The United States could instead permit the EU, Japan, and other developed countries to play the leadership role, and follow their lead. That would be unpalatable to many, but it would be better than doing nothing. Because of its dominant role in international affairs, however, the United States cannot simply get out of the way. If the United States does not lead or follow, it will be an obstacle to international efforts to achieve sustainable development.

The ethical and religious justifications for sustainable development also provide a reason that Americans should care. U.S. actions do not simply affect us; they affect others as well. Historic and continuing U.S. emissions of GHGs are likely to adversely affect others by contributing to rising sea levels and higher temperatures around the world, for example. Moreover, the texts and beliefs of each of the world's major religions teach responsibility toward other humans as well as the environment. Because Americans see themselves as a religious people, they should respond accordingly.

Finally, our government agreed to Agenda 21 and the Rio Declaration at the Earth Summit. These texts are not legally binding, but a nation's political commitment is not a trivial thing. Indeed, it is in the national interest to honor international political commitments.

The decisions we make about sustainable development are defining decisions for the United States. They will define the values for which our country stands.

SUMMARY

The major sections of this book focus on consumption and population; international trade, finance, and development assistance; conservation and management of natural resources; waste and toxic chemicals; education; institutions and infrastructure; and governance. What follows is a summary of each section, including a summary or excerpts from relevant individual chapters. For almost all chapters, the summary includes a review of efforts over the past decade and recommendations. While most of the recommendations are directed to the United States, a few are directed to the international community.

Consumption and Population

"To achieve sustainable development and a higher quality of life for all people," the Rio Declaration states, governments "should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies." As Agenda 21 observes, "the major cause of the continued deterioration of the global environment is the unsustainable pattern of consumption and production, particularly in industrialized countries." Agenda 21 also describes world population growth, in combination with unsustainable consumption patterns, as placing "increasingly severe stresses on the life-supporting capacities of our planet."

A simple model developed in the 1970's describes the relationship between population and consumption. The model is expressed as a formula: I = PAT. The formula expresses a community's overall environmental impact (I) as the product of its population size (P), its affluence or per capita level of consumption (A), and the technology and social arrangements that underlay each unit of consumption (T). While consumption of materials, consumption of energy, and population are not wholly determinative of environmental impacts, they are enormously influential.

Materials

Sustainable use of materials or resources can be measured by answering two questions. First, how is the rate of resource use related to the overall stock of resources? Second, what portion of resources in use are lost to the environment? The first question measures utilization of resources, and the second measures consumption. Put another way, the first reflects the sustainability of supply, and the second the sustainability of the receiving ecosystems. Almost all levels of resource use and

many types of environmental impacts in the United States have increased from levels already generally agreed to be unsustainable.

At the time of the Earth Summit, the average American was responsible for the extraction and employment of more than 100 pounds of material daily, which is more than any other country in world. These materials include metals, wood products, paper, agricultural products, construction materials, and fossil fuels. Ten years later, the quantity has increased by about 10 percent. The biggest increase over the past decade was for nonrenewable organic materials (including fossil fuels). The hike in overall materials use is also due in part to increases in the use of construction materials, such as sand, gravel, and stone, whose utilization requires large amounts of energy. Iron, steel, and other heavy metals continue to be used less, while light metals (particularly aluminum), plastics, and composites are used more. This latter trend is favorable, because the depletion time for heavier metals is shorter than that for aluminum.

Environmental impacts of resource consumption in the United States appear to have increased by about 15 percent over the past decade because of population growth and an increase in gross domestic product (GDP) per capita. Americans produce more municipal waste per capita than any other country, are the leading producer of GHG emissions, and are probably the world's largest producer of toxic wastes. This increase in U.S. consumption has occurred despite a movement from more resource-intensive production to greater use of services.

U.S. Government programs and policies have promoted inefficient utilization and use of natural resources. These policies include many types of direct and indirect subsidies for, among other things, timber cutting, agriculture, hard rock mining, and extraction and use of fossil fuels. While there are success stories in reduction of materials use and environmental impacts in the past decade (specific eco-industrial parks, corporate programs, and even government programs), these efforts have not changed the overall pattern or result.

To make significant progress toward sustainability, the U.S. Government should gain a better understanding of what resource sustainability really means, and should put in place a framework for achieving specific goals related to sustainability of materials. The United States should also lead international efforts to discuss and achieve sustainable production and consumption patterns in this and other developed countries.

Subsidy reform and restructuring existing taxes are two of the biggest challenges to sustainable consumption and production. Environmentally harmful subsidies need to be phased out gradually. In addition, the United States should begin shifting taxes from labor and income to materials and energy. This tax shift should result in more efficient use and reuse of materials and energy. Norway, Sweden, and other countries have already begun such a tax shift.

Public education is also essential to this effort, and is perhaps needed more than anything else. The principal cause of unsustainable resource use is largely a social system that promotes "conspicuous consumption" rather than intelligent, conservative resource use. Technological innovation can modify this trend somewhat, as can policy initiatives. But true sustainability will require that we satisfy our needs, not by increased use of resources, but by more intelligent use. Laws and policies alone will not lead to that understanding, but they might result from it.

Energy

Primary energy consumption in the United States increased by approximately 20 percent between 1992 and 2000, an annual average rate of 2.4 percent. This growth rate was higher than the 0.8 percent average annual growth rate of the two prior decades. At the same time, the average annual GDP increase for 1992 to 2000 was 50 percent higher than it was between 1972 and 1992, indicating that economic growth drove energy consumption.

For the production and consumption of energy, the journey toward sustainability can be measured by progress toward three goals: increased energy efficiency (or reduced energy intensity), increased renewable energy use, and reductions in energy-related CO_2 emissions. For the first goal, progress in the past decade continued at the same pace as the previous two decades. Energy efficiency, measured in terms of amount of energy consumed per dollar of GDP, continued to decline at the same steady pace it has declined since 1972-about 2 percent per year. While the United States is improving energy efficiency at a faster rate than other industrialized countries, it is less energy-efficient (or more energy-intensive) than these countries. For the second and third goals, the United States achieved less since 1992 than it did in the two decades that preceded the Earth Summit, and appears to be moving away from sustainability. Renewable energy consumption grew at a slower annual pace since 1992 (1.3 percent) than in the previous two decades (1.6 percent). In fact,

renewable energy's share of total U.S. energy consumption actually declined from 7.2 percent in 1992 to 6.9 percent in 2000. In addition, energy-related CO_2 emissions increased by 13 percent since 1992. The annual rate of increase in CO_2 emissions since 1992 (1.8 percent) is more than three times the annual increase of the previous two decades (0.5 percent).

In every major sector, energy use grew over the past decade. Energy use for residential and commercial buildings increased because of population growth and the trend toward larger and more energy-consuming homes as well the proliferation of electricity-using devices. These trends offset energy efficiency and energy conservation gains for appliances and home building materials. Energy use for passenger transportation increased because of the popularity of sport utility vehicles and light trucks and an increase in vehicle miles traveled. Energy use for freight transport increased because of rapid growth in the volume of freight shipped and a shift toward more energy-intensive trucking. Industrial use of energy increased, despite a shift away from energy-intensive industry, because of growth in manufacturing.

While the United States had in place numerous energy conservation and renewable energy laws at the time of the 1992 Earth Summit, the country has done little to strengthen those laws since then. Many of these early laws grew out of the Arab oil embargoes of the 1970's. Among other things, these laws established corporate average fuel economy (CAFE) standards for automobiles, required the U.S. Department of Energy (DOE) to develop mandatory energy efficiency standards for home appliances, provided tax credits to encourage investments in solar and wind technologies, and required utilities to make greater use of renewable energy and energy conservation. A few major changes in law and policy have occurred since 1992. Federal research and development funding for energy efficient technologies has increased, and standards continue to be issued for increasingly more efficient appliances. But CAFE standards for new vehicles have not been improved, despite substantial improvements in automotive technology.

Progress in sustainability for production and consumption of energy in coming decades can be measured in terms of progress in reduction of energy-related CO_2 emissions. Because reducing such emissions would require increases in energy efficiency and renewable energy, a decrease in CO_2 emissions is a useful way of summarizing progress toward all three goals. Analyses have shown that vigorous implementation of cost-effective energy efficiency and renewable energy policies could result in reduction of energy-related CO_2 emissions in the United States to 1990 levels by 2020 or earlier, which would be a major step toward energy sustainability goals. However, U.S. emissions in 2000 were more than 15 percent above 1990 levels, and are projected to continue to increase under business-as-usual scenarios.

The policies needed to achieve energy production and consumption sustainability goals are indicative of the seriousness of the needed effort. They include a carbon fee or charge that begins at a relatively low level and then increases over time. Money received from this fee or charge could be returned to the taxpayer in the form of lower income taxes or used to support sustainable energy programs. An emissions trading system should be coupled with the fee or charge to enhance its economic efficiency. Increased spending for Federal research and development for energy efficiency and renewable energy would likely lead to the development of more efficient, less costly, and more reliable technologies. In addition, a variety of policies should be employed to improve energy efficiency in buildings, industry, transportation, and electrical generation. Energy efficiency policies include a mix of tax credits, voluntary programs, increased energy efficiency standards for motors and appliances, improved fuel economy standards for motor vehicles, policies to increase use of telecommuting, and a requirement to increase the percentage of electricity generated by renewable energy.

U.S. population reached 281.4 million in 2000, an overall increase of 32.7 million, or 13.2 percent, since 1990. This is the largest population increase in any 10-year period in U.S. history, surpassing even the postwar baby boom. U.S. population is growing more rapidly today than is the Chinese population. One American consumes 17 times as much energy as the average Indian, and 9 times as much as the average Chinese. Thus, while the billion-plus populations in China and India obviously raise serious concerns, at the margin population growth is a bigger issue in the United States than in China or India. The reason is simple: an additional American consumes so much more than an additional Chinese or Indian.

In 2000, the average number of children born per woman in the U.S. population was 2.1, which is the replacement rate. Population grew significantly because of the "population momentum" caused by the higher birthrates of previous generations and because of immigration. Immigration is currently contributing roughly one-half of the annual population growth.

The sustainability of the current U.S. population can be questioned on a variety of grounds. The United States depends increasingly on imports of oil and other natural resources. Americans and other residents of industrialized countries are also living beyond their means, depleting vital ecosystems and nonrenewable resource stocks. A U.S. population with grossly disproportionate consumption patterns slated to grow by 10 percent or more per decade, while striving to raise its per capita consumption even further, is not a recipe for sustainability.

While the United States has no explicit policy regarding population size or growth, it does have one in practice. The tax code as well as laws on women's rights, inheritance, and labor all indirectly influence people's choices regarding family size. The legality and availability of family planning and abortion services have more direct influences on family size choices. Immigration laws and policies also play a large role in determining U.S. population.

The most basic thing the United States can do is simply recognize that population is a domestic as well as a foreign issue, and that the domestic and foreign aspects of population are linked. People seek to immigrate to the United States, for instance, because conditions in their own countries are not tolerable to them. The United States also needs to examine seriously its carrying capacity. The United States cannot claim that it is taking steps toward sustainable development without first analyzing its environmental resource base. This country should develop policies to ensure that the population does not exceed its carrying capacity, including its ability to draw on foreign resources. Immigration policies should be analyzed and developed in this context, and not the other way around.

International Trade, Finance, and Development Assistance

For better and for worse, America's domestic activities have a great influence on domestic activities in other countries. But U.S. foreign policy also has direct consequences for sustainable development. As Agenda 21 and the Rio Declaration make clear, a country's sustainable development commitments extend to both its domestic and foreign policy. This section summarizes U.S. international efforts regarding trade, official development assistance, and family planning assistance. It also summarizes U.S. efforts concerning an issue that has gained importance since the Earth Summit-private financial flows to developing countries.

International Trade

The United States has played a leading and generally positive role in steering trade rules in the direction of sustainable development, with modest success. Yet 10 years after Rio, the discrepancy between the vision of sustainable development and reality is too obvious to deny-current patterns of international trade cause environmental harm and impair sustainable development. By decreasing rather than increasing its attention to the profound problems of global underdevelopment and poverty, U.S. policy over the past decade has not only failed to serve the substantive policy goal of sustainable development but has also contributed to the polarization of international diplomacy between rich and poor.

Two major trade agreements were adopted in the past decade, and provide a context for this analysis. The United States negotiated the North American Free Trade Agreement (NAFTA) with Mexico and Canada to reduce trade barriers among the three countries, and then ratified it. Several environmental issues were directly addressed in NAFTA, and the Parties also concluded two separate environmental agreements. In addition, the United States and other countries concluded the long-running Uruguay round of trade negotiations, which established the World Trade Organization (WTO). The Clinton Administration secured congressional approval of the Uruguay Round results.

The United States has taken significant positive steps over the past decade to enhance consideration of the environmental and developmental consequences of its trade policy, and has actively supported institutions and polices that would promote such procedural integration of policy in other governments and international organizations. In 1992, the worlds of trade policy and environmental policy still knew very little about each other and seldom interacted. The use of an environmental assessment for NAFTA deepened awareness of the issues at stake for both government officials and the public. These and other experiences led President William J. Clinton to issue an Executive Order in 1999 requiring the preparation of an environmental review for most major trade agreements. On the other hand, the United States continues to subsidize and thus protect domestic agricultural producers and others that perpetuate environmental harms in the United States.

The United States has also been a pioneer in opening up its international trade processes to public participation and has been the leading proponent of participatory reforms in international institutions. The United States enhanced and structured

the access of environmental interests to trade policy during the 1990's. The United States has also been the most active and persistent proponent of increased public participation in dispute settlement procedures under WTO and NAFTA.

Yet America's substantive trade policies are very uneven in fostering sustainable development. Promoting the economic interests of the United States remains the central consideration in trade policy. As a result, U.S. trade policies often put short-term and purely domestic goals ahead of a broader sustainable development strategy. The widely publicized failure of the 1999 WTO ministerial meeting in Seattle occurred in large part because developing countries saw the U.S. position as giving short shrift to their needs.

In a broad sense, too, the structure of international trade still works against sustainable development. The fault, though, does not lie exclusively, or even primarily, with tradeofficials and trade policies. What goods are produced where and what services are provided where are influenced not by trade policy but by the economic, social, and geographical conditions of each country and the economic and social policies of national governments. A major problem has been the insistence by the United States and other developed countries that trade should replace aid as the main vehicle for transferring economic resources to developing countries, without attending in a timely or adequate manner to other conditions that must also be addressed if the resource flows of trade are to promote development on a sustainable basis. These other conditions include debt repayments and deteriorating environmental conditions in developing countries.

Domestically, the United States needs to deepen and institutionalize its policy integration. The United States should establish a sustainable development coordinating entity within the executive office of the president that would include the U.S. trade representative. Congressional responsibility for trade policy should also be reallocated to better incorporate environmental and developmental considerations. The United States should continue to advocate in all forums for increased transparency, including public availability of documents and summaries of confidential deliberations, enhanced access for the public to key processes, and nongovernmental organization (NGO) representation on national delegations at every appropriate international negotiation on trade issues.

To exercise greater international leadership, the United States needs to observe more faithfully in its domestic policies the policy prescriptions it advances for international trade and economic development in other countries, especially by removing barriers to access to the U.S. market and by eliminating substantial subsidies to key trade-relevant sectors of the American economy. The United States also needs to work more actively and constructively with developing countries to resolve key impediments relevant to international trade that are restricting their economic development and leading to continued environmental degradation. Moreover, while the "trade, not aid" mantra has substantial validity, aid continues to be a vital policy element, substantively and symbolically. As part of its trade policy, the United States needs to increase its official development assistance.

Official Development Assistance

U.S. official development assistance (ODA) has declined significantly since Rio. Developed countries agreed at Rio to provide ODA to developing countries in an amount equal to 0.7 percent of their GDP. The provision of this aid was part of the Rio bargain between developed and developing countries; developing countries were unwilling to have environmental conditions imposed on their development, but agreed to integrate environmental considerations and outcomes into their development process if they received financial help. The United States specifically declined to accept the 0.7 percent commitment, however. Part of the developed world's broad responsibility for sustainable development under Agenda 21 nonetheless includes assisting developing countries, especially when these countries are asked to respond to environmental threats that are largely not of their own making.

More broadly, sustainable development includes the antipoverty agenda of traditional development. The gap between rich and poor continues to grow. Among the 4.6 billion people who live in developing countries, three-fifths live in communities without basic sanitation, one-third are without safe drinking water, one-quarter lack adequate housing, and one-fifth are undernourished. One-half of humanity "survives" on less than $2 per day. The eradication of poverty is a worthy goal in itself. But from a strategic perspective, the eradication of poverty would also help reduce conflicts, social disruption, and disease. In addition, improved economic conditions may reduce the pool of the disillusioned and disaffected from which terrorist campaigns have frequently drawn.

Average annual U.S. ODA disbursements from 1990–1992 (set at 1999 prices) were approximately $12.38 billion; from 1998–2000, U.S. disbursements averaged

approximately $9.27 billion, representing slightly more than a 25 percent drop in real dollars. The United States still provides more ODA than any other country except Japan. As a percentage of gross domestic income, however, U.S. ODA declined from an average of .22 percent in 1984–1988 to .10 percent in 1998–2000, the lowest of all industrialized countries.

ODA does not account for all U.S. governmental assistance that could contribute to sustainable development. For example, it does not include U.S. aid to former Soviet bloc countries or the peacekeeping operations in Kosovo and Afghanistan. Nor does ODA include private financial flows to developing countries. Nevertheless, ODA levels indicate general trends and help identify the extent to which the United States is engaged with the rest of the world. ODA also does things that private financial flows do not; ODA supports peace and security, alleviates health and environmental crises, encourages educational improvements, and rewards countries that move toward democracy and the rule of law. In this way, it can help provide the infrastructure that will attract or encourage private investment.

Two funds for international environmental assistance were made permanent after Rio. The U.S. record in fostering sustainable development under these funds is mixed. The Montreal Protocol's Multilateral Fund exists to aid developing countries in meeting their obligations to reduce their production and consumption of substances that cause depletion of stratospheric ozone. Funds are disbursed for approved projects that contribute to phasing out ozone-depleting substances. Over the life of the fund, the United States has contributed its full assessed share-$327 million, or slightly more than one-quarter of the entire fund. The Global Environment Facility (GEF) provides funds to developing countries for specific projects to reduce GHG emissions and to protect biodiversity, international waters, and the stratospheric ozone layer. The United States paid its full share during the GEF's pilot phase, but has paid much less than its share since then. Because the United States was in arrears, other countries held off paying some of their commitment.

The United States should increase ODA for sustainable development, although it needs to ensure that this aid is actually effective. President George W. Bush's commitment in early 2002 to an additional $5 billion in foreign assistance is a step in the right direction. The United States would reap benefits from increased aid in the form of a more stable world and improved environmental conditions. By resolving questions concerning its financial commitments to multilateral organizations, the United States would also send a message that it is engaged in global issues and follows through on its international obligations. In addition to continuing its aid under the Multilateral Fund, the United States should clear up its arrears with respect to the GEF.

Beyond resources, there needs to be a new structure for development cooperation, not just an architecture for international finance. It should include not only development assistance but also trade, debt management, private investment and capital flows, private sector development, and access to technology. Instead of operating on a government-to-government basis, development assistance should be synergistic with private sector development and the strengthening of civil society as a whole. Development assistance must also be based on common interests and the complementary needs of the rich and the poor, defined to some extent by international agreements. In that sense, development assistance is part of the price we pay to prevent the root cause of threats to our security. Development assistance should, in addition, support sustainable human development, and not simply build economies and dams. Economies exist for people, not vice versa. Growth should replenish environmental heritage, not replace it. Development cooperation should also promote democratization and good governance, and it should be driven by the needs of the receiving country. Finally, for much of the world, development assistance should be recognized as an essential building block to a vibrant private sector and successful financial markets.

The international community should set firm financial and other commitments for developed countries to help realize the goals set by the U.N. General Assembly in its 2000 Millennium Declaration. These include, for example, the goal of reducing by one-half, by the year 2015, the proportion of the world's people whose income is less than $1 a day and the proportion of people who suffer from hunger. The international community should also ensure adherence to these commitments. At day's end, the only world that works is one in which the aspirations for fairness and opportunity by poor people and developing nations are being realized. Such commitments should, in addition, help strengthen developing country interest in cooperation on environmental objectives.

The results of aid matter a great deal. Accordingly, there should be some type of specific and regular reporting on how aid is used in developing countries, and what results it is achieving. This aid should foster sustainable development; it should not

support environmentally harmful activities or be lost to corruption. Such information should help inform and persuade the public and policymakers in developed countries about the benefits of international assistance for sustainable development.

Family Planning Assistance

Since 1992, the United States has provided an average of $430 million annually for family planning programs, and is the largest single donor to such programs. Still, the world's population is expected to grow to 9.3 billion by 2050, and nearly all of that growth will occur in developing countries. In addition to contributing to increases in poverty, resource consumption, and pollution, population growth plays a critical role in generating urbanization, migration, and political instability. At the 1994 Cairo Conference on Population and Development, countries agreed to curb population growth, not by setting numerical targets and focusing on birth control efforts, but rather by improving people's (particularly young women's) education, health, and social standing, on the theory that this would lead to smaller families. Developed countries agreed to provide one-third of the cost of implementing the Cairo program ($5.7 billion annually). Developed countries together, though, are providing only about one-third of what they promised in Cairo. And twice in the past decade, the United States has reversed its position on whether this family planning assistance can go to organizations that perform or actively promote abortion as a family planning method. The United States needs to be a more generous and consistent contributor to international family planning.

The international community should also build on the work of the Cairo Conference on Population and Development, which connected population growth to women's roles, rights, and reproductive health issues. Countries should collectively consider the relationships among population growth, distribution, and mobility; environmental degradation; and the spread of diseases. Two key sets of connections involve fresh water and global warming. Population growth is an exceedingly important factor in increasing demand for fresh water, and causing environmental degradation that compromises its availability. Population growth is also related, directly or indirectly, to national rates of fossil fuel use as well as land clearing and conversion, both of which are major sources of GHG emissions. It should also be noted that the populations most vulnerable to global warming and least able to adapt are among the most rapidly growing ones.

Private Finance

At the time of the Earth Summit, about one-half of the net flow of capital from developed to developing countries was ODA, and about one-half was private. By 2000, despite a series of financial crises in the late 1990's, private investment outstripped public assistance by a factor of almost seven to one. In 2000, private flows from the United States constituted 38 percent of total private financial flows to developing countries (as well as countries in transition to a market economy, such as Russia and Poland), a much larger portion than any other country. National-level capacity to promote sustainable development in many countries has lagged behind the rapid pace of economic globalization, and many investments affect transboundary or global ecosystems for which there is no governance infrastructure.

This surge in private finance was not anticipated in Rio. As a consequence, Agenda 21 provides little explicit guidance regarding the goals or policies that developed country governments should undertake to ensure that private North-South flows promote sustainable development. The Rio Declaration, however, provides some guidance, stating the importance of integrating sustainability into mainstream economic decisionmaking and of public participation in those decisions. Although there are many policy levers for influencing private finance, the two most significant institutions for influencing the environmental character of private financial flows to developing countries are bilateral export and investment promotion agencies and multilateral financial institutions.

The United States supports two key bilateral export and investment promotion agencies-the Overseas Private Investment Corporation (OPIC), an investment promotion agency, and the Export-Import Bank (Eximbank), an export credit agency. Environmental and social evaluation and disclosure requirements for OPIC and Eximbank have strengthened over time, particularly in the past decade. Projects funded by both are subject to environmental impact statements and detailed environmental reviews, for example. Some disclosure requirements, in fact, represent international best practice. But while reforms at OPIC and Eximbank have provided a basis for challenging environmentally and socially damaging projects, they fall short of an explicit mandate to promote sustainable development.

Multilateral development banks (MDBs), particularly the World Bank Group, also play a significant role in channeling private financial flows through their direct par-

ticipation in a variety of private sector transactions. MDBs have also played a significant indirect role in influencing North-South financial flows, particularly through their promotion of the "Washington consensus." The Washington consensus emphasizes the role of capital market and trade liberalization, privatization, and removal of other constraints on integration into the international economy. The United States controls the largest single share of capital subscription as well as the largest number of votes on the World Bank Group boards.

Even before Rio, the United States demonstrated significant international leadership in MDB reform by advocating environmental impact reviews and public participation in projects, but the United States has not yet adequately addressed the role of MDBs in leveraging private finance. For instance, environmental impact statements are still not required for structural adjustment loans from any of the MDBs, even though such loans are arguably the most potent vehicle for leveraging the policy environment in which private investment takes place. Experience during the 1980's and 1990's, moreover, showed that the Washington consensus could undermine sustainable development if not accompanied by strong independent regulatory capacity and other improvements in governance. In some cases, U.S. policy has promoted the Washington consensus at the expense of sustainable development.

The United States should work for further progress with both bilateral agencies and MDBs to move private finance toward sustainable development. For OPIC and Eximbank, the United States should move private financial flows to developing countries in a more sustainable direction by maintaining high environmental and disclosure standards. It should also promote the upward harmonization of sustainable development policies and procedures for export credit agencies. The United States should push harder for the integration of sustainability objectives into the private sector development activities of MDBs. The United States should proactively monitor the performance of MDBs in complying with agreed policies and strategies. Finally, OPIC and Eximbank, and the private sector arms of MDBs, should go beyond mere compliance with environmental standards and disclosure requirements, and shift their portfolios toward investments insustainability.

Conservation and Management of Natural Resources

Our environment provides the basis for our lives and well being, and also helps give meaning and context to our lives. Fresh water is essential for human life, for the growing of food and other "natural services" to humans, and for natural communities. Oceans and estuaries provide food, recreation, and jobs for humans. We need to be able to breathe healthy air. A stable climate has provided part of the basis for our civilization, ensuring reasonably consistent temperatures and precipitation from year to year, and thus providing a predictable basis for agriculture and other human essentials. Biodiversity can provide valuable products to humans, but it also has intrinsic value. Forests and agriculture provide necessary products and food, as well as a source of human livelihood. The land provides a basis for almost all human activities, and its proper use can make life easier or harder. Each of these is addressed here.

Fresh Water

Relatively little change in fresh water quality or the law governing fresh water has occurred in the decade since Rio. Agenda 21 promotes more sustainable, reliable, and healthy water supplies for both human consumption and economic uses, while seeking to restore and sustain the health of aquatic ecosystems. In 1992, the United States already had in place a detailed set of laws and institutions designed to protect and manage fresh water resources that implemented the basic tenets of Agenda 21 and the Rio Declaration. They include the Clean Water Act (CWA) and other Federal statutes, as well as State laws governing allocation and protection of water supplies. These measures laid the framework for sustainable use and protection of fresh water resources. As a result, most Americans have access to adequate supplies of fresh water of at least acceptable quality relative to much of the world, and U.S. agriculture and industry have similar adequate quantity and quality. These laws and institutions also provide the basis for integrated decisionmaking in the area of water resources, watershed-based restoration and protection programs, and aquatic ecosystem integrity. Legal tools exist to implement the precautionary principle for some, but not all, sources of water pollution.

The law governing fresh water has changed in only marginal ways since Rio, partly because legal tools for water resource protection were relatively sophisticated at the time. The lack of significant legal change is also due in part to political barriers to further improvements designed to address issues and problems that have evaded solutions under existing law. While additional regulations have been implemented to address more point sources of pollution, a comprehensive regime to tackle runoff

from agriculture, city streets, and other land uses remains elusive. Moreover, efforts to address the cumulative impacts of multiple sources of pollution on specific water bodies have been reinvigorated, but progress has been slow due to legal and political controversy. Similarly, legal tools to address physical impairments to U.S. aquatic ecosystems remain fragmented and poorly implemented. Some of the gaps in national and State programs to protect water resources have been filled by a wellspring of local and regional watershed programs around the country designed to promote collaborative, holistic solutions to problems in individual watersheds.

Little improvement has been realized in actual water quality since 1992. Long-term ambient water quality trends are difficult to evaluate, but available data suggest that, on a nationwide basis, there has been no clear trend in water quality over the past decade. Meanwhile, between 35 percent and 45 percent of the nation's rivers and lakes remain impaired for at least some beneficial uses. Threats to human health continue through contamination of swimming waters, fish and shellfish, and drinking water. Similarly, fresh water aquatic species and the ecosystems on which they depend remain impaired due to chemical pollution as well as widespread habitat loss and impairment. Indeed, fresh water ecosystems are among the most, if not the most, threatened ecosystems in North America.

The United States could make progress in reducing these problems through changes and improvements in U.S. freshwater policy. In addition to continued efforts to control industry and sewage treatment plants, an analogous comprehensive program to reduce polluted runoff from rural and urban sources remains imperative if additional water quality improvements are to be realized. These programs should involve both new pollution controls and changes in agricultural policy designed to prevent or to discourage farming of surplus crops on environmentally sensitive lands. Integrated, holistic watershed protection efforts need to be strengthened both by encouraging and supporting existing and new watershed programs, and by strengthening the legal tools in the CWA designed to address pollution from multiple sources. Aquatic habitat can be restored by including a broader range of impairments within the broad definition of "pollution" in the CWA. In addition, there should be improvements in Federal and State programs to protect wetlands, floodplains, and other habitats; to restore aquatic ecosystems that have been modified by dams, channelization, and other artificial structures; and to protect critical minimum-instream-flow regimes.

Oceans and Estuaries

Although the United States has played a leading role in protecting high seas fisheries, the ocean under its control appears to be in poorer shape now than it was in 1992. The United States controls more than four million square miles of ocean, an area larger than the country's land mass. Agenda 21 identifies four program areas that are particularly relevant to U.S. responsibilities for this area: integrated management and sustainable development of coastal areas, controlling marine pollution, protecting marine living resources of the high seas, and protecting marine living resources under national jurisdiction.

Coastal Areas

Existing laws have been insufficient to prevent the overall degradation of the nation's coastal zones or to make significant progress in restoring degraded areas, particularly degraded wetlands. Through Agenda 21, nations committed themselves to integrated management and sustainable development of coastal areas, including the application of preventive and precautionary measures to protect and preserve sensitive offshore ecosystems. Even before Rio, the United States had laws in place to encourage coastal zone management and to protect its wetlands and estuaries. However, one-half of the U.S. population lives in a county that has an ocean coastline, and the coastal population is growing faster than the Nation as a whole. If current projections are correct, population pressures are likely to result in further degradation of coastal wetlands, beaches, and waters and the services they provide, despite fairly extensive State and Federal regulation. To address these problems, Congress should decide that (1) preserving viable coastal zones for future generations is a national priority, and (2) preserving functional nearshore and offshore ecosystems and the services that they provide for the future requires buying, restoring, and preserving coastal property now, particularly functional wetlands and other buffer areas between the land and the sea.

Marine Pollution

Agenda 21 seeks to halt and reverse degradation of the marine environment from various sources of pollution. By the time of the Rio conference, the United States already had a reasonably effective legal structure in place to control pollutants from identifiable industrial, municipal and ship-based sources of marine pollution, and

from oil pollution. Runoff, however, is not effectively addressed. Most marine pollution now comes from sources that are not well regulated under the CWA-especially urban runoff and agricultural runoff. Congress thus should require States to have enforceable measures to control runoff, and should give private citizens a right to sue such polluters when they impair ocean quality. Congress should also amend the CWA to require the establishment of water quality standards for the part of the ocean that is under U.S. control.

Marine Species on High Seas

The United States was a world leader in international conservation of marine species before Rio, and it maintained that role throughout the last decade. Agenda 21 encourages sustainable use and conservation of living resources of the high seas. A number of commercially important fish species, such as tuna, mackerel, and marlin, as well as the great whales, spend much of their lives in waters outside any nation's regulatory jurisdiction. U.S. efforts over the last few years have included initiating new programs to protect species, such as sharks, that have only relatively recently become commercial fishing targets. But basic status of one-half of the fished highly migratory species is unknown. The United States should thus fund, or help fund, comprehensive international scientific research to obtain basic information about international marine living resources, and to reduce, and encourage other nations to reduce, catch limits for all species known to be or suspected of being in danger of being overfished.

Marine Species Under U.S. Jurisdiction

Fish stocks under U.S. Federal management are suffering, and there is insufficient information to determine the status of 65 percent of U.S. fish stocks. Yet there is reason to believe that Federal fisheries and fishery management may have improved since 1992. As Agenda 21 explains, although the marine living resources and nearshore fish existing mostly within a nation's jurisdiction can help meet a nation's nutritional and social needs, they can do so only if they are not overfished or overharvested. The 1976 statute governing fisheries was amended by the 1996 Sustainable Fisheries Act to incorporate sustainable thinking and a precautionary approach into U.S. domestic fisheries management. Still, it may take a decade before we can measure the true biological effects of legal changes in fisheries management, and the unintentional catching of nontarget species remains a problem. To make further progress, the United States needs to fund and support research to discover the complex interactions of marine living species and their environment. Without understanding marine ecosystems, truly sustainable management measures cannot be implemented. To facilitate comprehensive ecosystem management of its seas, the United States should also work toward overhauling its current species-by-species, medium-specific, multistatute, multigovernment, and multiagency legal regime for the oceans.

More generally, the United States currently lacks two visions of the ocean necessary to promote sustainable development-visions that it should articulate in the next few years. First, the United States needs a philosophical vision of the marine environment as an integrated ecosystem that should be used with caution. Second, the United States needs a more concrete vision of what the oceans under its territorial control should be. The Oceans Act of 2000, which establishes a commission whose sole function is to make recommendations for a coordinated and comprehensive ocean policy, offers the Federal Government a means to identify and articulate these two visions.

In the last years of the decade, and especially since 2000, the Federal Government has shown decidedly more interest in protecting its marine resources. This interest appears in the Oceans Act of 2000, in the Coral Reef Conservation Act of 2000, in President Clinton's Marine Protected Area Executive Order (which the Bush Administration has now adopted), and in the 2-year-long effort to turn the northern Hawaiian Islands into a national marine sanctuary. While recovery of ocean ecosystems can take decades, these recent legislative and executive efforts to protect the ocean suggest that the issue of sustainable ocean ecosystems may finally have arrived on the U.S. political agenda.

Air Pollution

Air pollution can make life unsustainable by harming the ecosystem upon which all life depends and harming the health of both future and present generations. The air pollution control activities described in Agenda 21 are broadly consistent with long-term U.S. law and policy, particularly the Clean Air Act (CAA). Several Rio Declaration principles taken together, including the right to a healthy and productive life in harmony with nature and the elimination of "unsustainable patterns of production," suggest the importance of focusing on the economic activities and tech-

nologies that produce air pollution. The overwhelming majority of air pollution comes from a single class of activities-burning fossil fuels. Emissions of most air pollutants declined somewhat over the past decade. Despite these improvements, the United States has not achieved the goals of the Rio Declaration because we have generally failed to do what we need to do-substitute clean sustainable technologies for the basic dirty ones in use when the CAA was enacted more than 30 years ago.

Since the Earth Summit, the United States has reduced emissions contributing to urban air pollution and acid rain, except for nitrogen oxides. Air pollution levels are still too high, however, to ensure all human beings have a healthy and productive life. Inspite of strong economic growth and growing population, carbon monoxide declined by 2 percent, volatile organic compound emissions by 13 percent, particulate matter by 7 to 13 percent, and hazardous air pollutants by perhaps 39 percent. Still, large sections of the country are not in compliance with health-based air quality standards. If the U.S. Environmental Protection Agency (EPA) succeeds in an effort it began several years ago to strengthen air quality standards, the CAA may deliver further benefits in the future.

An ambitious program to reduce sulfur dioxide emissions, created by the 1990 Amendments to that Act, resulted in an overall reduction of emissions from all sources by 17 percent between 1992 and 1999. This program has not stopped transboundary harms, however, and has not fully protected ecosystems; most lakes and ecosystems remain damaged. By contrast, the United States has made substantial progress in reducing pollutants responsible for stratospheric ozone depletion.

The United States has made only very modest progress toward deployment of sustainable technology. It has made substantial technological changes in sectors once served by ozone-depleting chemicals, and some progress with respect to sustainable vehicle technology (thanks to California's low emission vehicle (LEV) program), but almost no progress in changing how electricity is generated. New electric-generating facilities, which are built and operated to meet increased demand, tend to rely on less polluting fuels, particularly natural gas. Still, less efficient and more polluting electrical generating plants that were operating in 1970 continue to do so.

To move toward sustainable development on air quality, the country must move away from its dependence upon fossil fuels, especially fuels that produce such large contributions to urban air pollution, acid rain, and global warming. As a first step, the United States should phaseout coal-fired power generation, which supplied 51 percent of the power generated by electric utilities in 1998. The United States should also expand and strengthen the LEV program in order to replace the internal combustion engine. Government policy should be used to ensure that new technologies are continuously more efficient and less polluting than existing ones, and that existing technologies are actually retired on a periodic basis rather than allowed to operate indefinitely. Several legal mechanisms have the potential to create an economic dynamic favoring such a change. These include increasingly stringent mass-based limits, pollution taxes, and an "environmental competition law."

Climate Change

In late 1992, the United States became the fourth country in the world to ratify the U.N. Framework Convention on Climate Change (UNFCCC). Five years later, in 1997, the United States agreed to a protocol in Kyoto, Japan, under which developed countries would reduce their GHG emissions by about 5 percent from 1990 levels by 2008–2012, and the United States would reduce its emissions by 7 percent from 1990 levels in the same period. Although President Bush repudiated the Kyoto Protocol in 2001, the United States is still a Party to the UNFCCC. While the convention is a framework on which more explicit agreements are to be based, it nonetheless contains commitments. And these commitments are different from those in Agenda 21 and the Rio Declaration, because they are legally binding. For GHG emissions, the United States has failed to comply with the spirit, if not the letter, of the convention.

The United States is the world's single largest producer of GHG emissions. By 2000, U.S. GHG emissions were 13.6 percent higher than 1990 emissions measured in carbon equivalents. More recently, U.S. emissions were projected to exceed 1990 levels by more than 46 percent by 2020. (CO_2, a principal GHG, is not directly regulated under the CAA.)

The United States has generally adhered to UNFCCC obligations that are not related to emissions. Parties agreed to annually report their national GHG emissions and to develop plans to mitigate climate change. The United States has done so. In addition, Parties agreed to support and further develop research on global warming. The United States has consistently supported scientific research and has shared information about global warming with other Parties.

Although the UNFCCC contains no "hard" or "numerical" emission limitations, it does contain two commitments regarding emissions. First, developed countries agreed on a short-term goal-to "aim" to reduce GHG emissions to 1990 levels by 2000. The United States and other developed countries thus promised to adopt policies and measures that had a reasonable expectation of reducing GHG emissions to 1990 levels by 2000. A strong case can be made that the United States has failed to abide by this promise. President Clinton's proposed energy tax was rejected in 1993 by Congress. Then the Clinton Administration initiated a climate change program based on voluntary initiatives, but emissions continued to increase significantly.

The UNFCCC also contains a long-term goal, and commitments that go with it. Developed countries agreed to adopt policies and measures "consistent with the objective of the Convention." The convention's objective is "stabilization of [GHG] concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system." However, the U.S. actions described above, including repudiation of the Kyoto Protocol, are inconsistent with achieving the convention's long-term objective. In early 2001, the Intergovernmental Panel on Climate Change (IPCC), an international group of climate scientists organized under the United Nations, concluded that the earth's average surface temperature could rise by 2.5 to 10.4 degrees Fahrenheit (F) from 1990 to 2100, which is higher than the IPCC's estimate of 5 years earlier. This report also strengthened the IPCC's prior conclusion that human-caused global warming is already happening. A strong case can be made that the IPCC's projections of future climate change would constitute "dangerous interference with the climate system" even toward the lower end of the IPCC projection, and that it is already too late to prevent some atmospheric damage from global warming. The likely effects of global warming include rising sea levels, more frequent floods and droughts, and an increase in tropical diseases.

The excuses used by the United States for not acting are also inconsistent with the convention. Many U.S. decisionmakers have said it would be unfair to the United States to have to reduce GHG emissions if developing nations aren't required to do so. But in the UNFCCC, developed countries agreed to take the lead in reducing GHG emissions because they are responsible for the largest share of historic and current emissions, and because they have greater capability to reduce them. Many decisionmakers also claim that global warming science is too uncertain to justify programs that might turn out to be an unnecessary drag on the U.S. economy. Yet the United States and other UNFCCC Parties specifically agreed to take "precautionary measures" to reduce GHG emissions, and recognized that the "lack of full scientific certainty should not be used as a reason for postponing" cost-effective measures. Notably, many such cost-effective measures are available.

The United States should adopt GHG emission reduction programs that will reduce U.S. GHG emissions to 1990 levels as soon as technically feasible. Because the United States is already 13.6 percent above 1990 levels, and because a business-as-usual approach to GHG emissions is expected to significantly increase this difference in the next 6 years, the United States will also need to participate in emissions trading and use carbon sequestration projects, coupled with aggressive policy responses, to achieve this reduction. In addition, the United States should commit to make further reductions to achieve the Kyoto target of 7 percent below 1990 levels as soon as possible after achieving the first goal. This would allow the United States to merge with the approach taken by the rest of the world pursuant to the Kyoto Protocol even though it may be technically infeasible for the United States to comply with the Kyoto goal between 2008 and 2012. The United States needs to make it clear that it will eventually catch up with commitments being made by the rest of the world.

The record on voluntary global warming programs has demonstrated that they alone cannot be relied upon to achieve the type of reductions required. Therefore, the United States needs to adopt both emissions caps for various sectors and a mix of financial incentives and regulatory requirements. Moreover, the United States should take leadership on getting an international consensus on what atmospheric concentrations of GHGs will not present a dangerous interference with the climate system. That would help the international community better understand what national obligations will be needed to prevent dangerous interference with the climate system.

Biodiversity

The Convention on Biological Diversity, which seeks to ensure both the conservation and sustainable use of biodiversity, was opened for signature in Rio. The convention is a major innovation because it provides a legal foundation that did not

previously exist in the United States and in most other countries for the conservation of biodiversity. The United States has signed, but not ratified, the Convention on Biological Diversity. Agenda 21, which the United States did agree to, also provides for biodiversity conservation. Both Agenda 21 and the Convention on Biological Diversity would have nations adopt national strategies for the conservation and sustainable use of biological resources. Key elements of a national strategy include an inventory and monitoring of important biodiversity resources, and the creation of in situ (in place) biodiversity reserves. Ten years after Rio, the United States has no explicit comprehensive biodiversity conservation program in place, and a great many species and ecosystems are at risk.

Biodiversity conservation is still not a generally accepted legal standard in the United States. At best, it is an objective which may be considered along with other competing objectives when resource managers make allocation decisions that promote or impair biodiversity. The reason is simple. Biodiversity emerged as a concept after the basic public land and environmental laws were in place, and domestic politics have prevented ratification of the Convention on Biological Diversity and all efforts to develop a national biodiversity conservation strategy.

The Endangered Species Act (ESA) of 1973 does not provide a complete foundation for such a strategy. The ESA imposes a duty on public and private parties to prevent the extinction of a limited number of endangered or threatened species-those that are listed under the Act. In 2000, more than 1,200 species were listed, but an estimated 66,000 were at risk of extinction. The ESA is also a backward approach to biodiversity because it only indirectly addresses the major cause of biodiversity loss-habitat destruction-and it does not address other causes such as the invasion of exotic species and air and water pollution. Since 1992, however, the ESA has evolved to encourage the use of large-scale multispecies habitat conservation plans and other forms of ecosystem management. By the end of 2000, the U.S. Department of the Interior had approved habitat conservation plans covering 20 million acres. While this suggests that it is possible to move from individual species to general biodiversity conservation within the framework of the ESA, the results of this approach have yet to be tested by time.

Since the Earth Summit, many biodiversity conservation initiatives have been started in the United States by all levels of government and by private parties. But they are often ad hoc efforts to solve a single example of past environmental degradation, such as the restoration of sheet flows to the Everglades, or efforts to avoid a worst-case enforcement scenario under the ESA. The U.S. Government has also tried to manage large blocks of public lands on an ecosystem basis and has participated in ecosystem restoration experiments on a collaborative stakeholder basis. These efforts have occurred in national forests, wilderness areas, national parks, and Bureau of Land Management lands-areas that in many cases could be turned into public land biodiversity reserves. These efforts are extremely fragile because they lack a firm legal foundation, can be modified in response to changed political conditions, and include no clear performance standards to measure their success should they endure. Thus, the future of many of the biodiversity-related conservation initiatives implemented since 1992 is in doubt.

To implement the Earth Summit's objectives, the United States should immediately take four steps. First, it should ratify the Convention on Biological Diversity. Ratification would establish biodiversity conservation as an overarching legal objective in the United States and stimulate the development of a comprehensive national biodiversity conservation strategy. Second, the legal mandates of the major Federal land management and regulatory agencies should be revised to require them to conserve biodiversity to the maximum extent consistent with due process and the sustainable use of natural resources. This would include clarifying the role of State and local governments as well as private parties in habitat conservation plans. Third, the United States should create a Biological Survey, equal in stature to the U.S. Geological Survey, to inventory the nation's biodiversity heritage and to provide the necessary scientific support for the establishment of biodiversity indices and conservation performance standards. Finally, although biodiversity conservation is primarily a national responsibility, private land stewardship must be recognized and supported.

Forestry

The United States made halting steps in law reform and in the implementation of forest sustainability during the past decade. The governments meeting in Rio agreed to a separate set of principles for sustainable development of forests. In general, sustainable forestry is based on ecosystem integrity, economic viability, and social responsibility. Other principles relevant to the United States include opportunity for stakeholder participation in forestry decisions, "timely, reliable, and accu-

rate" information, comprehensive assessment of forest values, integration of forest management with management of adjacent areas to protect viability or unique ecosystems, and the incorporation of environmental costs and benefits into market mechanisms.

Forest ecosystems cover one-third of the land area of the United States, and two-thirds of that land is productive enough to have value as commercial timberland. Public forests account for 42.4 percent of the forest area in the United States; they are owned and managed by the Federal, State, and local governments; and have contributed disproportionately to sustainability through demonstration programs and innovative practices. Private forests account for the rest. The basic structure of forestry law, firmly established prior to 1992, provides the background against which to discern recent trends.

The physical area of forests changed little in the past decade. Data on species diversity, forest structure, water quality, and many other dimensions of ecological sustainability are not cumulated nationally for forests in a way that invites evaluation of changes since 1992. Information on economic viability and social responsibility is even more elusive.

After the Rio Summit, the U.S. Forest Service began a slow, but steady, shift toward general sustainable development principles. The most important legal vehicle for promoting this change is the Government Performance and Results Act, which was enacted in 1993. The legislation requires all agencies to set both long-and short-term measurable performance objectives and to conduct periodic assessments and revisions. This spurred the Forest Service to employ adaptive management to monitor and evaluate its activities based on parameters relating to such sustainability criteria as the health of the land, quality of water, and user satisfaction. These changes help provide "timely, reliable, and accurate information" about forests. The Forest Service also shifted its emphasis under the ESA from interagency coordination and prohibitive policy to the broader use of habitat conservation plans. In 2000, the Forest Service promulgated a new framework for planning that establishes maintenance and restoration of ecological sustainability as the first priority for management. The 2000 rule, and a 2001 rule prohibiting logging and road building in many roadless areas of the national forests, constitute the single most important positive development in the application of substantive standards to promote sustainable development of public lands. The Bush Administration, however, has indicated that it will alter both regulations.

On private lands, a slight strengthening of State forest practice laws and increased promotion of best management practices have improved the legal regime, but these changes tended to be overwhelmed by market forces. Until water pollution control begins to force abatement and mitigation of runoff, private forest owners will not face significantly heightened incentives for sustainable practices. On the other hand, new certification systems for sustainable practices have arisen in the past decade; under these programs, third parties such as the Forest Stewardship Council certify forest products as "sustainable," and major purchasers confine their purchases to certified products. These systems have begun to reshape market demand.

In the coming decade, the United States should strengthen its legal mechanisms for promoting public participation, citizen enforcement, best forestry management practices, and landscape-level planning. These recommendations are top priorities for facilitating sustainable development. Existing property, market, and administrative regimes can all be deployed in the service of more sustainable forestry by flexibly demanding that environmental performance indicators be achieved through mitigation, ecosystem services, and adaptive management. In addition, the 2000 and 2001 rules should be supported, not altered. These regulations are important because large-scale, e.g., forestwide, planning is needed to implement ecosystem management. Federal and State governments should also throw their purchasing weight behind the Forest Stewardship Council's certification program.

Agriculture

The United States has a diverse and dynamic system of agriculture. If it is to be sustainable, it must meet at least three criteria that are explicit in or logically derived from Agenda 21 and the Rio Declaration. Agriculture must become internally sustainable, which requires that it preserve its resource base; avoid pollution, salinization, or other degradation of the soil and water; and be able to respond to plant and animal disease, pests, periodic climate variation, and changing market conditions. Agriculture must also be externally sustainable. That is, it must not impose external costs on nonagricultural society or surrounding natural resources. Finally, agriculture must exhibit responsive sustainability; it must be sufficiently dynamic and flexible that it is able to respond to change and help the Nation respond

to crises in other sectors of the economy, e.g., to participate in global warming remedies through the use of sequestered carbon.

Internal sustainability is being challenged in the West by competing demands for irrigation water, although the increased use of water conservation practices eases this somewhat. From 1992 to 1997, however, one-quarter of all agricultural land converted to urban uses was prime farmland.

U.S. agriculture is not externally sustainable. Since 1985, there has been a gradual and fundamental change unfolding in Federal agricultural policy. A series of programs (evidenced by the 2002 farm bill) now encourage farmers to adopt conservation or environmental protection practices on some of their land. Taken together, these mostly voluntary agricultural programs represent a vast investment in conserving practices. Still, farm policy continues to direct farmers away from sustainability. The system of support payments, which will grow even larger now that the 2002 farm bill has become law, encourages farmers to grow commodity crops, which have greater adverse environmental effects, and drives small, family farms out of business. There are larger and fewer farms employing ever more intensive practices, usually in the form of monoculture. There is almost universal reliance on inorganic fertilizers to replace lost natural soil nutrients. Chemical pesticides are heavily relied on to deal with the vulnerability of monocultures to pests. Pollution of both surface and groundwater from agricultural sources may be the single largest source of pollution in the Nation. Waterways of all types suffer from sedimentation.

Responsive sustainability is challenged by several uncertainties, perhaps the clearest of which is climate change. Rapid changes in climate, including more frequent droughts and floods, could be disastrous for agriculture. Another example of uncertainty is the effect of specialization in the use of genetic stock. Because the United States operates an agricultural system that is close to monocultural, future pests, diseases, or human dilemmas could create large problems unless we preserve the broader genetic stock, or germplasm, from which current plant varieties are derived. Other sources of uncertainty are created by the increased use of genetically modified organisms and by world markets.

Steps needed to move the United States toward sustainable agriculture include the stabilization of irrigation agriculture through greater water conservation and protection against salinity. The United States should also renew its campaign to reduce erosion. Prime agricultural land must be protected against urban and suburban development. The nation's larger drainage systems should be re-engineered to achieve systematic control of polluted runoff. In addition, affirmative steps should be taken to protect germplasm. More generally, the internalization of environmental costs should be an obligation of contemporary agriculture. For the long term, the science of ecology must be fully integrated into agricultural research.

Land Use

Sprawl continued during the past decade. The "smart growth" movement has led to some legislative and policy changes, particularly at the State level. But there is a wide gap between the talk of reform and actual reform, and not enough time has elapsed to fairly assess whether any of the policy changes are making a meaningful difference.

Sustainable land development requires consistent integration of social, environmental, and economic considerations in decisionmaking to produce a sound, coordinated, and harmonious built environment. Our system of land use controls and decisionmaking must be consistent both horizontally (among and between neighboring jurisdictions) and vertically (from one level of government to the next). Achieving this result requires heightened levels of intergovernmental cooperation, coordination, and support. Effective sustainable land development policies must minimize sprawl and maximize sound development opportunities so that the United States may conserve important lands, preserve the natural environment, protect air and water quality, promote affordable housing through compact development and urban renewal, and encourage urban "infill" rather than rural development.

Agenda 21 asserts that national governments should delegate "planning and management responsibilities to the lowest level of public authority consistent with effective action." This is the lightning rod of land use reform debate in the United States-whether traditional local land use planning and decisionmaking can achieve sustainable development.

The smart growth movement is proving to be, at least in rhetoric, a solution for both the disorganized and inefficient system of land use controls of the past and a framework for a new future paradigm. In general, smart growth principles mirror many of the implementation strategies for sustainable land development under Agenda 21.

At the national level, there has been a lot of talk, some bits and pieces of reforms, but overall very little action. The Federal Government has taken notice of allegations of environmental injustice in the siting of various locally unwanted land uses, and has taken initial steps to foster greater social equity.

There is a much greater level of activity in many States than at the national level. While there were some State-level comprehensive land use planning reforms before 1992, the last decade has witnessed an unprecedented level of attention and activity at the State level. Some States have undertaken a comprehensive recodification of State planning and zoning enabling statutes that provide local governments with tools to promote sustainable land use. More than one-half the States explored reform options through task forces or study commissions. Some States have adopted changes through public referendum initiatives. Yet on balance States are just starting to make significant statutory changes that offer the promise of promoting more sustainable land development practices. It will take even more time for these reforms to translate into observable and quantifiable changes in our neighborhoods and communities once States have provided the opportunity for changed behaviors.

Sustainable land use will require continued leadership for, and interest in, meaningful land use reforms. States must create a new culture of cooperative and intergovernmental decisionmaking at the local level. State and Federal Governments must target spending on initiatives and programs that promote urban renewal and infill, and thus revitalize our cities. The Federal Government should also modify existing programs so that, where State and local participation is optional, access to Federal money is conditioned on implementation of sustainable land use plans.

Waste and Toxic Chemicals

According to Agenda 21, the root cause of waste and toxic chemicals problems is unsustainable patterns of production and consumption. These patterns are unsustainable because they harm humans and ecosystems, deplete materials and energy, and, in some cases, may threaten national security. This section summarizes U.S. efforts concerning toxic chemicals as well as pesticides. It also summarizes U.S. efforts concerning three types of waste-hazardous waste (including Superfund), municipal solid waste, and radioactive waste. In addition, it summarizes State and Federal legislation facilitating private cleanups of brownfield sites-sites contaminated with hazardous substances.

Toxic Chemicals and Pesticides

The United States made significant progress in moving toward a more sustainable approach to chemicals and pesticides over the past decade, but still has a long way to go. The most relevant sustainable development principles are the precautionary principle, intergenerational equity, access to information, integrated decisionmaking, and control of trade of hazardous chemicals in international trade. They apply with particular force to chemicals and pesticides because of incomplete information about their risks, their potential to cause future harms, and the need for public information about them.

Little progress was made in reducing the risks of chemicals that are currently being used in commerce. The 1976 Toxic Substances Control Act (TSCA) requires manufacturers of new chemicals to submit information about the environmental and health risks of these chemicals to EPA before they can be manufactured. Relatively little information exists concerning the 60,000 or so chemicals already in commerce that were grandfathered under TSCA, and little progress was made in assessing their risks over the past decade. Several voluntary information collection initiatives-one for high production volume chemicals and another for chemicals to which children are commonly exposed-are promising, but it remains to be seen whether anything more than assessments will be conducted.

Similarly, little progress was made concerning the introduction of new chemicals into commerce. Although premanufacture approval is required under TSCA for new chemicals, the United States requires relatively little information before giving that approval. While both EPA and the EU have concluded that requiring better information would reduce risks, EPA has not taken steps to do so. The EU runs a premarket approval program rather than, in the case of the United States, a premanufacturing approval program. Because only 10 percent of new chemicals are likely to go to market, the EU program focuses more intensely on fewer chemicals, and thus permits a more certain hazard prediction than the system of review used in the United States.

The toxics release inventory (TRI) led to continued reductions in chemical releases over the past decade. Under TRI, manufacturing facilities with 10 or more employees report releases and transfers of several hundred toxic chemicals. Between 1988 and 1999, total releases of the "core" set of chemicals that were reported consist-

ently over that time declined by 45.5 percent, although total production waste increased slightly. The TRI was expanded in the 1990's to include hundreds of new chemicals, Federal facilities, and new industry groups. These expansions have increased the information available to citizens, which may lead to further reductions.

Pollution prevention would further many of the goals of sustainable development because it relies on more efficient processes and practices to reduce the amount of pollution that is created. Although much progress was made in the development of pollution prevention tools and education, it is not clear to what extent pollution prevention has been adopted in practice.

Use of pesticides in agriculture has leveled off since 1985, and utilization of the most highly toxic pesticides has declined. But the most important change in pesticide regulation over the past decade occurred with the adoption of the 1996 Food Quality Protection Act. The Act focuses on pesticide residues in food, and requires EPA to assess the aggregate and cumulative risks of these pesticides, rather than assessing safety based on one pesticide and one medium at a time. The Act also requires safety factors, reflecting both the precautionary principle and intergenerational equity.

The United States made some progress in the regulation of genetically modified organisms (GMOs) under TSCA, but it did not put in place a framework for regulating the new GMO plants that are being bred to produce chemicals. Such organisms are increasingly the technology of choice for the manufacture of chemicals and pesticides.

In the international arena, the United States has been at the table for negotiations and has been among the world's leaders in developing and adopting international standards for chemicals, some legally binding, and some not. However, the United States has not yet ratified certain recent treaties and protocols. These include the Rotterdam Convention on Prior Informed Consent (prohibiting the export of specified chemicals without explicit agreement by the importing country), the Stockholm Convention on Persistent Organic Pollutants (protecting health and environment from specified pollutants), the Cartagena Protocol on Biosafety (setting up an international framework for managing trade of GMOs and seeds), and the Biodiversity Convention on which the Cartagena Protocol is based.

To make progress, or further progress, toward sustainable development, Congress should modify TSCA to provide a clearer standard for health and safety to encourage greater pollution prevention. TSCA should also be amended to shift the presumption that chemicals are "innocent until proven guilty" to a burden on manufacturers to prove that chemicals are safe as used in the market. In addition, TSCA should be amended to level the playing field between new and existing chemicals; the present approach perversely creates disincentives for bringing new and safer technologies to market. New chemicals should be reviewed on a premarket, not a premanufacture, basis, and manufacturers should be required to submit the same kind of information they would to the EU. EPA also needs to broaden its use of tools for the management of chemical risks, including labels and hazard classification. As new chemical hazard information is generated by EPA through voluntary screening initiatives, TRI listings should be modified accordingly.

The United States should evaluate its pollution prevention efforts to determine where they have succeeded and failed. The United States also needs to expand efforts to integrate pollution prevention into core regulatory efforts for air, water, and waste management. EPA needs to implement the Food Quality Protection Act on a priority basis, in a transparent manner, and with full public disclosure. In addition, the United States needs to revise the regulatory framework for regulation of biotechnology and assure that it will effectively cover both new and existing products. Moreover, the United States needs to seriously consider whether a labeling approach might have a place in enhancing consumer confidence, if not the safety, of such foods. Finally, the United States should ratify the agreements described above. In the longer term, the United States needs to recognize that many of the major chemical risks do not respect national boundaries.

Lead

In the past 10 years, the United States has used its domestic efforts on lead poisoning prevention and abatement to help support efforts in other countries. Lead poisoning remains a serious threat to health and development, particularly but not exclusively in developing countries. Because lead poisoning is expensive and difficult if not impossible to cure, prevention is the best approach. The United States should maintain and intensify its leadership role on lead poisoning prevention in an internationalized context by supporting adoption of a Global Lead Initiative (GLI) and by playing a leadership role in implementing it thereafter. The GLI should be designed to complete a worldwide phaseout of leaded gasoline on an expedited basis,

and use the momentum from that success to address the multiple other sources of lead exposure. The United States should continue to support the global phaseout of leaded gasoline in all relevant international fora. The United States should also support such complementary activities as the development of an international network dedicated to raising public awareness and exchanging best practices for phaseout and prevention, including those based on U.S. experience.

In addition to the United States, the international community should support the establishment and implementation of a GLI to complete the phaseout of leaded gasoline and then other sources of lead poisoning. While the conquest of lead poisoning would constitute a signal victory in itself, its concrete achievement should also serve as an optimism-engendering model of international cooperation adaptable to solving other threats to sustainable development.

The project should initially convene a technical advisory group to work in partnership with identified government focal points, as well as NGO's and the private sector, to prepare action plans for phaseout that include milestones and timelines for national action. Mandating, not merely recommending, the formation of the technical advisory process and funding, not merely morally encouraging, the GLI as a sustained project are essential to its success.

Hazardous Waste and Superfund

The basic structure of U.S. domestic laws with respect to hazardous waste was established in the 1970's and 1980's. The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or the Superfund Act) created a multifaceted scheme for eliminating dangerous conditions created by hazardous waste spills and improper disposal of hazardous substances. The Resource Conservation and Recovery Act (RCRA) focused on "cradle-to-grave" regulation of ongoing hazardous waste generation, transportation, and disposal.

Agenda 21 is premised on an "overall cleaner production approach," with the goal of preventing or minimizing further hazardous waste generation, which would have the United States go further. Rio Declaration principles supporting integrated decisionmaking and the reduction and elimination of unsustainable patterns of production and consumption provide a foundation for that. Indeed, a zero level of hazardous waste generation appears to be a worthwhile long-term goal. In addition, Agenda 21 calls for environmentally effective management of the waste that is generated. Agenda 21 also urges ratification of the Basel Convention on the Control of Transboundary Movements of Hazardous Waste, which sets forth more effective rules with respect to the transboundary shipping of hazardous wastes.

Cleanup activity under CERCLA has been completed on about one-half of all Superfund sites listed on the national priority list, and more than 6,400 removal actions have been undertaken since 1993 to remove immediate and direct public health and environmental threats. Although CERCLA has been very modestly amended in the decade since Rio and subject to some intermittent administrative "fine tuning," those legal changes have diminished or, for the most part, left unimproved the statute's overall environmental effectiveness. While the legislation was amended in early 2002 to encourage private cleanups at contaminated or "brownfield" sites, the statute still excludes oil-based wastes at non-brownfield sites, and the exemption for secured creditors was actually broadened in 1996. Moreover, EPA's tax-based Superfund trust fund has not been replenished since the special Superfund taxes expired at the end of 1995, and the fund will run out of money in 2003 unless significant changes are made.

Similarly, RCRA has never been comprehensively amended with a view to implementing sustainable development for hazardous waste. While the statute intensively regulates certain wastes, the legal definition of hazardous waste creates many regulatory uncertainties, and the statute excludes "solid or dissolved material in domestic sewage" and "solid or dissolved materials in irrigation return flows"-two major and environmentally unsound loopholes. Moreover, the statute lacks any enforceable provisions directly intended to decrease or eliminate the generation of hazardous wastes. EPA's biennial hazardous waste reports reflect relatively little recent progress in decreasing the generation of hazardous wastes. Nor has the United States ratified the Basel Convention.

To move toward sustainable development, CERCLA should be amended to narrow its exemption for secured creditors, to eliminate the statute's "petroleum exclusion," and to provide a stable source of funding for the Superfund program, at realistic levels, for at least another decade. RCRA (and CERCLA) should be altered to mandate phased decreases in the generation of hazardous wastes (by dates certain) at U.S. industrial facilities, to provide that hazardous wastes in domestic sewage and irrigation return flows be made subject to RCRA regulation, and to replace RCRA's current regulatory definition of "hazardous waste" with a consistent, straight-

forward, and comprehensive definition. The United States should also ratify the original version of the Basel Convention and amend domestic hazardous waste laws to conform with the convention.

Brownfields Redevelopment

The United States has as many as 500,000 brownfield sites, properties that are underdeveloped or abandoned because of actual or potential contamination from past industrial or commercial use. Because of CERCLA and counterpart State laws, ownership or use of these properties could result in significant liability. In the past decade, virtually every State has adopted laws to facilitate the reuse of brownfield sites through voluntary cleanup programs. These laws confer three principal advantages on private sector actors and others who are willing to remediate a site-streamlined administrative cleanup procedures, relaxed cleanup standards, and liability protection. Brownfields revitalization is widely viewed as successful, as thousands of sites have been remediated in State programs. In early 2002, similar provisions under CERCLA were signed into law.

Each decision to remediate and reuse a brownfield site eliminates environmental health risks while promoting reinvestment, creating jobs, slowing the acceleration of suburban "greenfields" development, decreasing polarization of communities, and fostering public involvement in every aspect of redevelopment efforts. Brownfield redevelopment thus involves integrated decisionmaking, promotion of sustainable human settlements, and public participation-all central features of sustainable development. In principle, too, State leadership in brownfields revitalization fulfills the Agenda 21 recommendation that national governments delegate institutional responsibility for sustainable development "to the lowest level of public authority consistent with effective action."

States should modify their programs in three ways to make them more fully consistent with sustainable development, however. First, a higher level of government oversight is needed to ensure early, simultaneous, and coordinated consideration of social, environmental, and economic goals. There is typically no comprehensive review of the project and little if any supervision of the cleanup process. The assumption is that redevelopment will result in less contamination, but that is merely an assumption. States should modify their laws to provide for State oversight throughout the process.

Second, a shortcoming of virtually every brownfields program is the relative lack of concern for future generations. State and Federal programs define success in terms of short-term results based on specific uses that could change over time or with future ownership. States should modify their laws to guarantee long-term protection of sites where remediation has taken place.

Third, there is relatively little opportunity for public participation in the cleanup process. Public participation is especially important because many brownfield sites are located in neighborhoods with higher than average concentrations of persons of color and other minorities. Public involvement helps ensure equity in the decisionmaking process and helps ensure consistency between community plans and developer plans. States should thus require full and active citizen participation throughout the revitalization process.

Municipal Solid Waste

Solid waste, according to Agenda 21, is all waste that is not radioactive or legally hazardous. In the United States, the term encompasses nonhazardous industrial, oil and gas, mining, agricultural, and municipal solid wastes. While municipal solid waste, also known as trash or garbage, comprises only a fraction of these wastes, it is easily the best known and best studied of these types of waste. Accordingly, this part of the review focuses on municipal solid waste.

Agenda 21's objectives for solid waste are contained in a hierarchy of (1) minimizing wastes that are produced, (2) maximizing environmentally sound reuse and recycling of wastes, and (3) the environmentally sound disposal and treatment of wastes that cannot be used or reused or recycled. Underlying this hierarchy are estimates of relative environmental impact and cost. Each successive tier of the hierarchy involves more materials use and loss. That, in turn, means more loss of economic value and, generally, more environmental impact than the previous level.

Based on this hierarchy, the following three indicators or goals appear to be a useful way of measuring a move toward sustainable waste management: (1) decreasing per capita generation; (2) decoupling of waste generation from GDP; and (3) even if waste generation rises, decreasing per capita waste disposal though increased recycling, composting, and resource recovery.

A threshold problem in analyzing U.S. efforts in meeting these three goals is a lack of standardization about what is and should be counted. Three prominent data

sources that should be useful in analyzing sustainability trends at the national level collect data in different ways and make different assumptions in accounting. Still, it is possible to discern basic trends.

First, per capita waste generation in the United States declined somewhat from 1990 to 1995, but has increased steadily since 1996, perhaps owing to the strong economy. Second, there does not appear to be any decoupling of waste generation from GDP; in fact, GDP increases seem to automatically include commensurately increasing waste generation rates. A trend toward lighter packaging appears to have been offset by increases in purchasing and waste. Finally, even after recycling and composting, the numbers of pounds of waste generated per capita per day have been increasing since 1996, according to both California and EPA data.

These three trends are particularly notable, because the past decade saw large changes in how municipal solid waste is managed. The trash capacity crisis that the country faced in the late 1980's created tremendous enthusiasm for recycling and waste reduction programs. These programs have had a significant and positive effect. EPA reports that, in 1999, although 230 million tons of municipal solid waste were generated, 50 million more tons of waste were not created due to waste prevention programs. The trash capacity crisis also led to the development of larger, more environmentally protective landfills and incinerators, as a result of which capacity is no longer a significant issue. That growth in infrastructure, however, has reduced pressure for recycling and waste reduction.

To move toward sustainability, the United States should make progress on all three goals or indicators. To reduce per capita waste generation, States could follow the lead of an Oregon statute that sets goals for stabilizing and reducing per capita waste generation. To decouple waste generation from GDP growth, the United States should explore examples of where decoupling has already occurred, e.g., yard waste, and develop programs that are targeted at specific waste streams. To reduce per-capita waste disposal, more recycling and composting is needed, coupled with incentives to reduce waste being disposed. Better and more nationally consistent data is necessary for all of these recommendations, and for all solid wastes.

Radioactive Waste

Radioactive waste results from nuclear-powered electric generation and other civilian uses as well as the manufacture and disposal of nuclear weapons. In addition to its radioactive nature, it differs from other wastes because it can be highly dangerous for thousands of years and because some radioactive waste can be used to make new nuclear weapons. As a result, the control of radioactive waste deeply implicates the security aspects of sustainable development.

While the cold war ended just before the 1992 Earth Summit, the full meaning of this change had not yet permeated the nuclear establishment. Since 1992, an enormous rethinking of the role of nuclear technology and the management of nuclear waste has begun. Enormous stockpiles of "special nuclear materials" and other radioactive materials that were painstakingly built up for nuclear weapons arsenals have been rendered surplus, raising difficult questions about what to do with them. Moreover, Agenda 21 focused only on commercial nuclear waste, not on radioactive waste from nuclear weapons production. Because of greater public awareness and disclosure about problems related to nuclear weapons production since the Earth Summit, it is now apparent that the cost of radioactive waste cleanup at nuclear weapons productionsites far exceeds the costs of civilian radioactive waste controls.

In the 10 years since Rio, the United States took a number of actions that move the country closer to sustainability in nuclear waste control, if measured by the limited recommendations set forth in Agenda 21. Among other things, Agenda 21 calls on countries to minimize radioactive waste, transfer radioactive waste control technologies, and support international efforts for radioactive waste control. Private industry has reduced the amount of low-level commercial waste per unit of activity. The amount of high-level nuclear waste from nuclear weapons material production was reduced largely by DOE's lower level of nuclear weapons production, but not by efficient operations. The United States has generally supported technology transfer in radioactive waste control. On the other hand, some technologies promoted for radioactive waste control may present significant risks of facilitating nuclear proliferation. The United States provided significant and broad support for international and regional cooperation and coordination, even though its efforts were uneven.

When measured against the broader principles in the Rio Declaration, however, the United States has fallen short of making significant progress toward sustainability in radioactive waste controls. U.S. controls on most radioactive waste generally contain explicit, if imperfect, requirements that intergenerational or long-term impacts be considered. The issue of intergenerational impacts has been a focus

of debates about the effectiveness of proposed geologic repositories for such wastes. However, neither a complete understanding of the implications, nor a mature ability to deal with this issue, have yet evolved.

Significant progress has been made in opening up radioactive waste control to public knowledge and participation. Much remains to be done, however, and some backsliding has already begun. DOE began an "openness" initiative to provide the public more information about radioactive waste control, but that effort has waned, and large amounts of information that were previously available on websites from the United States have been eliminated, ostensibly for security purposes.

Since 1992, two events have improved worker safety, but the overall problem of DOE self-regulation remains intractable. First, DOE has begun to encourage modern integrated safety management techniques to involve all workers in safety planning. Second, Congress passed a landmark worker compensation bill that provides Federal compensation for cancer, chronic beryllium disease, and silicosis to current and former nuclear workers and their surviving family members. Unfortunately, DOE is retreating toward its traditional insular culture of self-regulation and contractor self-assessments, thus reversing the momentum toward greater contractor accountability and safety that was developed in the 1990's.

The polluter-pays principle is particularly problematic in the case of radioactive waste. The intergenerational nature of radioactive waste almost guarantees that some of the costs will be borne by future generations rather than by those who benefited from electric power or nuclear weapons. A limited trust fund was established for one site, and there were proposals for other trust funds. To the extent that waste and liability producing practices fail to internalize the full costs of doing business, the same practices will continue to produce environmental problems.

To make progress toward sustainability in radioactive waste control, the United States will need to rely on existing laws and institutions more effectively. But new organizations and institutions will likely be required to operate new facilities for plutonium disposition and for long-term stewardship of facilities where radioactive waste has been stabilized or contained, but not removed. A dedicated trust fund and politically insulated organization will likely be required to ensure the availability of funds for post-cleanup stewardship of nuclear facilities. The United States needs to invest in better science and technology to provide a stronger and more publicly acceptable basis for decisionmaking. The government needs to acknowledge the seamless connection between certain aspects of radioactive waste control and nuclear weapons proliferation. It should therefore support changes in the International Atomic Energy Agency to separate its regulatory safety and safeguards functions from its nuclear promotion activities. Finally, the government should seek to bridge the gap between current policies and the public's understanding and support for those policies. A major challenge is whether technical concerns about the security of radioactive wastes and related nuclear operations are compatible with open and democratic decisionmaking processes.

Nongovernmental Actors

As Agenda 21 and the Rio Declaration recognize, an informed and active civil society plays an integral role in realizing sustainable development. A democratic society can only accomplish the far-reaching individual and organizational changes required for sustainable development by making readily available the information that citizens need to make their own choices and by involving citizens in making societal choices. More generally, sustainable development is not simply the responsibility of governments. Every part of civil society has a role to play, not just in influencing government decisions, but also in the activities it conducts on a daily basis. Public access to information and governmental decisionmaking processes is one key aspect of this issue. Another is the role played by business and industry. A third is the extent to which sustainable development is understood in ethical or religious terms.

Public Access to Information, Participation, and Justice

In 1992, the United States already had in place basic laws and practices to promote transparency, participation, and accountability. These include the Freedom of Information Act (FOIA), the Administrative Procedure Act, the Government in the Sunshine Act, and access provisions in most environmental laws. During the past decade, FOIA was amended to include electronic as well as written material. Executive Orders began to build a structure to incorporate the goals of the environmental justice movement into the Federal Government, and bring some new voices into decisionmaking.

Yet overall change in the past decade was not measured primarily by new laws, but rather by practical changes in access to information. The 1990's brought a dramatic growth in access to information through the Internet. Research on indicators

to track sustainable development flourished. As an alternative to litigation, collaborative decisionmaking processes became more common, bringing more perspectives, information, and ideas for finding solutions to the table. Environmental Defense, an environmental advocacy organization, developed a web-based scorecard that allows residents to find emissions from factories or power plants in their community.

Even as new technology greatly increased the public's ability to share and use data, though, public reporting and analysis of information and participation in decisions stalled or lost ground in some respects. It proved difficult to develop a more unified and integrated information system that would give citizens easier access to government information. Such efforts often faced bitter political divisions and an entrenched legacy of fragmented information systems and structures developed around separate laws and programs of an earlier era. In a period of declining civic engagement, much of the country's innovative energy and investment went into technical developments rather than improving governance structures and norms, despite efforts to reinvent government to serve citizens. Judicial action made it more difficult to utilize established citizen suit provisions. Internationally, the United States sometimes took the lead but often stood on the sidelines on access issues.

The United States has not taken the basic step of adopting-let alone using-a set of indicators and institutionalizing a process to involve the public in decisions aimed at sustainable development. A new Administration refused to make public the list of companies consulted in developing its energy plan, constrained access to Presidential records, and adopted a narrower interpretation and application of FOIA.

The assumptions for expanding access were abruptly reframed following September 11 as the country struggled to address the potential use of information by terrorists. After the first, hurried decisions to remove some information from the Internet, the debate has begun to be reframed in terms of identifying specific types of data for which the danger of generalized public availability outweighs the public's interest in access. Yet this framing also recognizes that public access is, itself, a way to reduce risk by providing information that spurs public awareness and action.

In this changed setting, the United States can take seven steps to put information and participation at the center of action to achieve sustainability, both at home and internationally. The United States should develop, adopt, and make regularly available to the public indicators of sustainable development. The United States should also develop environmental indicators and use them in preparing and publishing an annual state of the environment report. More broadly, the United States needs to adopt a set of principles that reflect the significant role of information in good governance and in enabling the public to play its role in sustainable development. The United States should also make significant investments in developing websites and web-based tools to tailor information to the needs of individuals and organizations. In addition, the United States should establish a national forum to engage citizens and NGO's on sustainable development. The government should find ways to strengthen public access to justice, reversing the past decade's general trend toward restricted public access to the courts. Finally, the United States should play a lead international role in promoting transparency, public participation, and accountability. To do so, the United States should, among other things, ratify the Aarhus Convention on Access to Information, Public Participation in Decisionmaking and Access to Justice in Environmental Matters.

Business and Industry

Sustainable development can only be accomplished with the support of business and, as some firms are beginning to discover, there are profits to be made from sustainability. Agenda 21 charted a course of action for business and industry in five main areas: (1) global corporate environmental management; (2) environmentally sound production and consumption patterns; (3) risk and hazard mitigation; (4) full cost accounting; and (5) international environmental support activities. For its part, American business has tended to ignore sustainable development since Rio. Of the firms that have engaged the concept, most have concentrated exclusively on its environmental dimension. That is not to say there has not been meaningful advancement since Rio, particularly in business' ability to manage the environmental aspects of operations, goods, and services. In addition, some American companies are among those pioneers working on the sustainability frontier. But the journey is in its early stages, and the U.S. business community is by and large still formulating a case for, and a plan of action on, sustainable development.

Over the last several years, many large and medium-sized firms, and to a lesser extent even smaller enterprises, have been continuously improving techniques to promote compliance with environmental laws. More recently, and particularly in the last 5 years, leading firms have begun to focus on nonregulated aspects of operations, and are experimenting with new methods to reduce their environmental foot-

print, increase competitiveness, and capitalize on opportunities created by next-generation policy initiatives that work with the grain of the market. Some of these firms can point to significant progress toward sustainability, especially in areas such as eco-efficiency, environmental management systems, communications with stakeholders, and transparency. Changing internal and external perceptions of social equity, the prospect of cost reductions and market share growth through innovation, increased shareholder value, positive brand recognition, and a variety of other factors are gradually but perceptibly prompting business to adopt strategies founded on sustainability principles. Only a limited number of companies have endeavored to incorporate sustainable development into operations and strategy, however, and some of these firms have been much more active than others.

Building on insights gained in dealing with globalization, and guided by a sharper perspective of national security and the benefits of multilateral action in the wake of the terrorist attacks of September 11, government and private enterprise need to come together to forge a tighter alliance on all three dimensions of sustainable development: the social, the economic, and the environmental. To make further progress, government, business, and other interested stakeholders should consider the following framework. First, business needs to operationalize the concept of sustainable development in practical business terms. Second, the Administration, together with leaders from business and environmental organizations, needs to build a stronger constituency for sustainable development in the business community and Congress. Third, the Administration and business both need to gain a better understanding of the interdependent relationship between globalization and sustainable development. Fourth, Congress, the executive branch, and the business community need to work together to promote and facilitate good governance through national implementation and international cooperation.

Fifth, business, working with government, financiers, investors, insurers, consumers, NGO's, and the public needs to develop sustainability indicators, data, and communication techniques that will enable informed distinctions among companies, goods, and services. Sixth, business, working with NGO's, supply chains, and other stakeholders, needs to significantly expand the web of existing partnerships and strategic alliances in order to promote new and better techniques and tools, and to spread best practices more widely. Seventh, lawmakers and policy decisionmakers (at the Federal, State, and local levels) need to work with leaders from business, NGO's, the bar, and the community to achieve consensus on a satisfactory blend of policy instruments to foster sustainable business practices. Eighth, changes in the nature of management education are needed so that graduates emerge from business schools with the ability to incorporate sustainable development and considerations of corporate social responsibility as elements of competitive strategy.

Sustainability as a Religious and Ethical Concern

The United States should support, and the U.N. General Assembly should endorse, the Earth Charter. The Earth Charter, which was completed in 2000 after a 5-year process that involved extensive consultations and outreach, articulates the inspirational vision, basic values, and essential principles needed for a global ethic to support sustainable development. The Earth Charter contains 16 principles and 61 supporting principles, and has broad resonance among the world's major religions and ethical systems. Its main purpose is to establish a sound ethical foundation for the emerging global society, and to help build a sustainable world based on respect for nature, universal human rights, economic justice, and a democratic culture of peace. The Earth Charter is intended to help people of all ages in every walk of life to better understand the spirit and implement the substance of truly sustainable development. Besides showing what sustainable living is all about, it offers a coherent, integrated standard for evaluating possible responses to particular issues. And, as one of its drafters stated, the Earth Charter is intended "to give the emerging global consciousness the spiritual depth-the soul-needed to build a just and peaceful world community and to protect the integrity of Earth's ecological systems."

Endorsement of the Earth Charter by the U.N. General Assembly would not, of course, make it legally binding. But it would signal recognition by the world's leaders that sustainable development has a compelling ethical and religious foundation. That, in turn, could have a powerful and positive effect on efforts to move toward sustainable development, including efforts in the United States.

Education

Aside from the word "government," "education" appears more often than any other term in Agenda 21. Education underlies and has the potential to reinforce every other priority. Education also provides future voters and decisionmakers with the intellectual tools needed to achieve a sustainable society. Government can help edu-

cate people by providing information and ideas. But our educational institutions for kindergarten through twelfth grade, as well as our institutions for higher education, also have a crucial role to play.

Kindergarten Through Twelfth Grade

Education for sustainability at the primary, middle school, and high school level builds on environmental education by helping students understand and address the relationship between natural systems and the effect of human social and economic activities on those systems. Agenda 21 seeks to reform educational systems and practices accordingly. Happily, U.S. resources-tangible and intangible, financial and human-could be instrumental in solving these problems. Kindergarten through twelfth grade (K–12) education is a major shaper of the truths, attitudes, ethics, concepts, and behaviors of American society. By reshaping K–12 education in the United States so that it systematically and effectively fosters sustainability, we will be able to make greater progress toward the achievement of a sustainable world.

Groundwork has been laid in the 10 years since Rio for sustainability education. Some recent changes in educational practices, e.g., service learning, a focus on literacies and skills, standards that support interdisciplinary understanding and complex thinking, and growing recognition of the importance of systems thinking, help to prepare our youth to understand and implement sustainable development. Several organizations, and a network for those organizations, now exist that attempt to define and develop skills and dispositions in youth that will enable them to create a more sustainable world as future workers and citizens.

In the past decade, an understanding of what sustainability education should mean has also been developed in the United States. A broad consensus can be seen among the goals of sustainability education theoreticians and practitioners on some key student outcomes and some essential knowledge, skills, and dispositions. These include ecological literacy, including human-environment relationships; system dynamics and "systems thinking"; the ability to truly value and learn from others; an understanding of the importance of place; sustainable economics; citizenship; and creativity and visioning. Each of these is being taught, to some degree, in some classrooms.

Overall, however, education for sustainability has only a toe-hold in mainstream K–12 education in the United States. The United States has not adopted sustainability education as a clearly stated, broadly applied, national goal. Very few K–12 educators in the United States have ever heard of sustainability education; few educators have worked explicitly to implement education for sustainability in their classrooms. While our educational system works to develop many of the discrete skills that future problem solvers will need to diagnose and solve our global problems, as a Nation we lack the systematic understanding that explains these complex threats to sustainability. Our educational system, moreover, is often inappropriately focused on basic literacy and easily testable knowledge, which does not adequately prepare future voters and decisionmakers to understand current problems and to craft solutions for them. We do not prepare teachers to create experiences for students that help them engage with the rich, complex, interdisciplinary world in which they live. We do not fund the infrastructure needed to support a sustained and nationwide implementation of an educational program for sustainability. Only a single State, Vermont, has educational standards that explicitly address sustainability. Even environmental education, an important and well-established component of sustainability education, is increasingly eclipsed in importance and increasingly slighted in funding.

To make significant progress on sustainability education, schools of education need to ensure that teachers understand sustainability, and can apply this knowledge and skill in the work they do with students. State education organizations should approve standards for sustainability education. Statewide assessments of student learning should be modified to reflect this goal. These efforts should also connect students with work being done in the community to foster sustainability. While some first-rate work has been done to create and distribute curriculum units, much remains to be done. Of course, public and private funding is needed to support this effort. A change in the knowledge and skills that colleges and universities expect from entering students could also help move K–12 education for sustainability forward.

Higher Education

Higher education for sustainability is like environmental education because it draws on an environmental foundation. But it is different from much environmental education because it includes the social and economic dimensions of sustainability, and is designed to help students think about problems in an integrated manner.

Since higher education to date largely fails to expose students to issues and considerations outside the narrow confines of their disciplines, it consequently fails to produce integrated decisionmakers. Higher education for sustainable development primarily involves teaching students to understand ecological, social, and economic problems through the many lenses of an interdisciplinary framework. It assumes that integrated decisionmaking is not possible without integrated thinking. Effective and rigorous teaching of integrated thinking-without becoming soft and watering down the disciplines-is both a powerful intellectual challenge and a profound necessity.

A genuine commitment to creating a sustainable future would be evidenced in most of the following seven critical dimensions of institutional life. These are based on Agenda 21 and various national and international conferences. Disciplinary, professional, liberal arts, and general education requirements at the university would involve interdisciplinary decisionmaking and reflect a fundamental concern for sustainability. Research at the institution would focus significantly on sustainable development. Faculty and staff development rewards would cultivate an understanding of, and contributions to, sustainable development. Campus operations would be oriented toward reducing the institution's "ecological footprint." Student opportunities and engagement on campus would reflect a deep commitment to sustainability through new student orientation, scholarships, internships, and job placement counseling. The institution's outreach and service would support local, regional, and global partnerships to enhance sustainability. The university's mission, structure, and planning would communicate and promote sustainability.

Since the Earth Summit, however, education for sustainable development in the United States has been underfunded and undersupported, both within and outside the academy. Tensions have arisen between environmental educators and sustainability educators, and no consensus has been reached on who or what institutions should guide higher education for sustainability. The U.S. Government has shown little interest in pursuing this agenda. For the most part, pressure on universities and colleges to begin to embrace the challenge of sustainable development has originated from within. At a small minority of institutions, highly motivated and committed presidents, faculty members, staff members, and students have effected change in significant ways. At a larger minority, there is evidence of increased eco-efficiency in operations or new offerings in environmental studies. Colleges and universities in America are increasingly adopting sustainability initiatives in one or more of these seven critical dimensions of institutional life. But an authentic institutional commitment to sustainable development is rare.

A deeper commitment to sustainable development in higher education requires three broad changes. First, higher education must commit itself to steady reform in teaching, research, faculty and staff hiring and development, operations, student opportunities, outreach, and mission and structure. Second, sustainability must become a priority of the specialized academic organizations, disciplines, and professions that influence universities. Third, external stakeholders, including opinion leaders, alumni, employers and funders, should pressure Federal and State governments to move the education and research agenda of higher education toward a greater focus on sustainability. Since the Federal Government provides more than 90 percent of the funding for academic research, it influences deeply the priorities for research and helps shape academic fields.

Institutions and Infrastructure

In a sustainable society, effective governmental and nongovernmental institutions deliver essential services to people on an equitable basis. The built infrastructure for necessary public services in a sustainable society should also be durable, available and affordable to all, and environmentally protective or restorative. Two key examples are transportation and medical and public health services.

Transportation

The traditional approach to transportation planning in the United States has been to maximize roadway capacity, travel speed, and mobility, generally within the context of large subsidies to motorized transportation. A sustainable transportation system, by contrast, seeks to maximize efficiency in overall resource use. In Agenda 21's words, it is "more efficient, less polluting and safer." Its basic components include increasing modal diversity, with more emphasis on public transit, walking, and bicycling; paying more attention to the pattern of transportation and land use; encouraging use of efficient transportation modes whenever practical; charging users the true costs of transportation; and encouraging better connectivity between modes.

American transportation policy has become increasingly cognizant of these patterns. Just as Agenda 21 was being adopted, the United States was entering the beginning stage of a fundamental change in Federal transportation policy. While the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 authorized substantial Federal funding for highway expansion, its name suggested the beginning of a new direction-a greater emphasis on all modes of travel, not just highways, and an emphasis on environmental and economic efficiency. In general, ISTEA eschewed substantive regulatory requirements in favor of procedural ones intended to assure the consideration of nationally important goals, along with appropriate funding mechanisms to enable regions and States to put efficiency strategies into effect. The cornerstone of this approach was (and remains) a planning process established for metropolitan areas and States that is intended to "minimize transportation-related fuel consumption and air pollution." The Transportation Equity Act for the 21st Century (TEA–21), adopted in 1998, reauthorized the 1991 law with only minor changes to these key provisions.

Despite some positive trends in the past decade, however, the environmental impacts of transportation generally increased. From 1995 through 2000, transit use grew 21 percent while driving increased by just 11 percent. The growth rate in vehicle miles traveled per capita slowed somewhat from what it had been in the 1980's. On the other hand, a number of trends all point to increased inefficiency in travel patterns. The number of vehicle miles traveled grew from 2 to 2.6 trillion miles between 1990 and 1998. Other negative trends include an increase in average trip length, growth in the number of vehicle trips taken per person and per household per year, and a decline in average vehicle occupancy. Transportation is by far the largest consumer of petroleum products in the United States, accounting for some two-thirds of our oil consumption. Transportation is also responsible for rising CO_2 emissions and continuing unhealthy air quality. In some communities, parking lots now constitute the largest single category of land use. Increased driving also means increased congestion; Americans now spend roughly one of every eight waking hours in cars.

The United States is moving toward sustainability in transportation in some respects; there have been measurable improvements in process, in mode shifts, and even in some environmental indicators. But with long-term trends foretelling a dramatically growing population and a growing economy, mere motion toward the goal is not enough, because the goal is itself moving farther and farther away, and becoming more difficult to achieve.

To move the United States to an effective course for sustainability in transportation, Congress and the Federal agencies must buildupon the policy reforms of the 1990's through a suite of measures. The first step is to recognize clearly that travel choices available to most Americans have been sharply curtailed by past policies, from high subsidies to housing to tax polices and zoning laws, that have made it unattractive or impossible to choose more sustainable options such as walking, cycling, riding transit, living close to our jobs, and driving smaller, more efficient motor vehicles. Another step is to establish and work toward specific transportation goals, such as increased energy efficiency, equal access to jobs, and a safe walking route to school for each child. The United States should also adopt policy measures that would reduce demand for motorized transportation; encourage the use of alternative transportation modes; and reduce the environmental, social, and economic costs of transportation.

Medical and Public Health Services

The U.S. health system works very well, compared to the developing world. But the comparison to the remainder of the developed world, especially to the wealthier European countries, is not as favorable. The health provisions of Agenda 21 focus not only on environmental pollution but also on basic medical care, preventive medicine, and improving mental as well as physical health. Equality in access to basic goods and services is part of sustainable development, both as an issue of fairness and because sustained inequalities impede development and destabilize society. Thus, basic medical and public health services are critical to a more just and economically sound nation.

While no bright line separates public health services from personal medical services, medical services are those that treat diseases and injuries in the individual. Public health is concerned with the community. Public health services are not a substitute for personal medical services, but they can prevent the need for medical services, and they are less expensive and more widely available than medical services.

The U.S. sanitation system works well, with outbreaks of water and foodborne illnesses happening infrequently enough to be front page news. Yet the public health system has suffered from decades of neglect, a lack of national standards, frag-

mentation of staffing and resources among thousands of legal jurisdictions, and a general lack of public support and funding. As a result, the system is vulnerable to breakdowns and has a limited ability to cope with new threats, including terrorism and climate change.

The level of communicable diseases in the United States, especially human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), is high for a developed country, and affects sustainable development. Communicable diseases are transmitted by people to other people, and are thus different from sanitation or environmental diseases. The poor suffer disproportionately from such diseases, both because access to medical care services is limited for the poor, and because environmental factors increase the spread of communicable diseases among the poor. Ironically, past success in eradicating smallpox and polio, and in dramatically reducing measles and tuberculosis, has undermined public support for communicable disease control spending and programs.

Over the last 10 years, there has been no progress in improving access to medical care in the United States. Indeed, there are some indications that the quality of available care has diminished due to economic pressures. The United States does not guarantee universal access to medical care. Instead, it relies on a combination of voluntary, employer-paid health insurance, government entitlement through Medicare for the elderly, and a limited program for indigent persons not covered by employer-paid health insurance. Approximately 40 million persons are not covered by any of these plans, and many persons with some coverage still do not have adequate access to medical care. Congress has been unwilling to assume the burden of universal access or of increasing employer mandates, and the States do not have the economic resources to bridge the gap. This results in a less healthy work force and distorts economic development because it disproportionately harms low wage earners.

To move closer to sustainability, the United States should retain local enforcement for public health, but provide standards, funding, and oversight at the Federal level. There should be a national civil service system for public health professionals, especially those who manage health departments. The United States also needs to fund proper postmortem examination procedures to diagnose every death from a communicable disease. In addition, the United States should set standards on antibiotic usage to identify patterns of disease spread and to limit the development of antibiotic-resistant organisms. Universal health insurance would improve individual health and the health of the population, which would be good for development and might reduce projected incremental costs as preventive services improve. If the United States is not prepared to do that, it should at least make routine care and preventive services universally available. This would include providing education and support to improve health habits, such as better nutrition, exercise, and the cessation of dangerous habits such as smoking. By doing so, the United States would improve health and productivity, serve distributive justice, and bring the country closer to sustainability for basic medical services.

Governance

The national government, as well as State and local governments, needs to play an important role in sustainable development. Perhaps the most important thing they can do, Agenda 21 says, is integrate their decisionmaking on environmental, social, economic, and security issues. National governments are also urged to delegate "responsibilities to the lowest level of public authority consistent with effective action." In the past 10 years, no level of government in the United States has provided strong support for sustainable development. State and local efforts, though, have been more widespread and effective than national ones.

Local Governance

Integrated decisionmaking should, at least in principle, be easier at the local level, because the connections between economic, social, and environmental issues are easier to understand and most of the relevant stakeholders live or work nearby. Agenda 21 calls on localities to consult with key stakeholders to arrive at a consensus on local strategies for sustainable development, and States that by 1996 most local authorities in each country should have developed "a local Agenda 21" for their community. However, Agenda 21 does not generally address the reality of multiple municipalities within a specific metropolitan region. Fragmented decisionmaking among municipalities in the same region causes sprawling growth patterns that increase traffic, cause air and water pollution, increase water consumption, and destroy wetlands. Communities and regions across the country also continue to be largely divided along economic and racial lines, both physically and socially.

National policies to foster community sustainability did not change significantly in the past decade. Significant progress was made in promoting the redevelopment of brownfields and providing alternatives to highway transportation, but many Federal laws continue to be obstacles to local sustainability. The Federal mortgage interest deduction, for instance, favors wealthier home buyers over those who are less wealthy, renters, multifamily property owners, and people who rehabilitate existing structures.

Many States enacted "smart growth" laws to control some of the environmental effects of sprawl. But all too often, these laws leave untouched a framework of State laws that encourage the creation of largely autonomous municipalities, and require that these municipalities raise revenue by property taxes to support services within their boundaries. Such laws encourage municipalities to compete for property wealth and exclude less expensive housing, a tactic that fosters sprawl and impedes intermunicipal cooperation. The lack of laws requiring coordination in housing, education, regional revenue sharing, and land use remains a major obstacle to local sustainable development efforts.

At the local level, a few communities adopted "local Agenda 21s" through broad participation, but municipalities in the United States are beginning to show great creativity and innovation on local sustainability. Municipal sustainable development efforts-in locations such as Burlington, Chicago, and Santa Monica-were encouraged by the PCSD. Those municipalities and others employed techniques such as inclusionary zoning, providing incentives to developers to use existing sewer and water infrastructure, and reducing water usage. But most municipalities have a long way to go. For example, although mixed use zoning promotes walkable, pedestrian-friendly neighborhoods, most municipalities still require single use zoning.

Achieving local sustainability will require more than local efforts. Congress and the Federal Government should use conditional funding mechanisms to provide incentives for municipalities to cooperate and grow smartly. The Federal mortgage interest deduction should be changed so that it does not encourage single-family housing. States need to move toward a system that better promotes regional governance and shares taxes within a region. States should also create regional planning commissions and empower them to use various regulatory and fiscal incentives and disincentives to encourage cooperation among municipalities and channel growth in particular ways. States, in addition, should modify their zoning laws to encourage more mixed-use zoning. Municipalities should charge, and be empowered to charge, fees requiring developers to pay the full cost of new services and infrastructure. As municipalities move toward a regional approach, each municipality in a region should also accept its "fair share" of affordable housing units. And at all levels, more must be done to provide incentives for the establishment of public/private partnerships and broad-based consensus-building efforts.

State Governance

The goals of sustainable development-simultaneously achieving economic, social, environmental, and security goals while maintaining the ability of future generations to attain such goals-are the goals of State governments. Except for the national security element of the security goal, States have great responsibility for achieving those goals in the United States. The decentralized decisionmaking recommended by the Rio Declaration and Agenda 21 is also consistent with the constitutional structure of U.S. governance, which gives substantial authority to States.

Before the Earth Summit, many States promoted integrated decisionmaking through laws requiring environmental impact statements for major projects, constitutional provisions concerning the environment, planning laws, and statutes encouraging pollution prevention. They did not necessarily result in the type of integrated decisionmaking envisioned by the Rio Declaration and Agenda 21, but they did substantially increase the level of consideration of environmental issues in economic development decisions. Many State constitutional provisions and statutes also contained aspirational language concerning intergenerational equity. Federal pollution control statutes adopted in the 1970's and 1980's used a Federal-State partnership model that strongly encouraged States to improve their environmental programs and allowed them to continue exercising authority in areas where there is no Federal regulation.

Since the Earth Summit, a number of States have made substantial progress in creating and implementing policies aimed at achieving sustainable development. As a group, States are fulfilling their role as laboratories for experimenting with programs and are, to an extent, leading policy development in the United States. Minnesota, New Jersey, and Oregon have established or expanded planning, decisionmaking, and goal-setting efforts for sustainable development. Maryland enacted a series of programs intended to reform land development practices by encouraging

development in existing centers and discouraging development of greenfields. Many States have undertaken supportive policy-specific initiatives that are consistent with sustainable development, including laws and policies to foster smart growth, recycling, energy efficiency, renewable energy, watershed protection, pollution prevention, and redevelopment of brownfields. A report by the Resource Renewal Institute evaluating the "shifting emphasis toward sustainability" in all 50 States, however, shows a substantial gap between the leading and lagging States.

Devolution, or transferring power to States to deal with environmental issues, also dominated discussions of environmental law in the 1990's. The National Environmental Performance Partnership System (NEPPS) was established in 1995 to provide States the opportunity to negotiate greater flexibility within the context of existing Federal pollution control laws.

Maryland, Minnesota, New Jersey, and Oregon have also established indicators to track progress toward sustainability. Minnesota's Progress Indicator suggests that the State's gross domestic product may overstate that State's actual progress toward environmental, economic, and social goals. In 2000, the State reported that, according to the Progress Indicator, the State's performance peaked in the mid-1980's, and had declined to a point where by 1995 the levels were similar to the indicator's values for the early 1960's.

In the next 5 to 10 years, States need to make sustainable development an explicit goal. More States need to follow the examples set by leading jurisdictions and adopt and implement strategies and policies promoting sustainable development and holding themselves accountable (through the use of indicators) for achieving sustainability. Governors must ensure adequate and effective interagency cooperation by designating a cabinet-level person who will be responsible for fostering sustainable development, including sustainable land development. States should also make greater use of environmental impact assessment, particularly to bring intergenerational equity into their development and policy decisions. Finally, States should work with EPA and other Federal agencies to use NEPPS to improve Federal-State environmental governance for achieving goals, and for monitoring and reporting progress.

National Governance

In a world of sovereign nations, sustainable development cannot be achieved unless it is actively supported by national governments. In a basic sense, the requirements for good governance for sustainable development are the same as those for good governance in general. These include effective governmental institutions, national laws, a favorable investment climate, public access to information, public participation in governmental decisionmaking, and access to justice. But sustainable development requires more than that. Most basically, it requires that national governments integrate the environment into national decisionmaking in broader and deeper ways over time. Agenda 21 recommends that they do so through national strategies. At the 5-year review of Earth Summit commitments in 1997, nations agreed to have such strategies in place by 2002. National strategies would guide governmental decisionmaking on a range on issues, include priorities and timetables, change in response to changing conditions, and harness the energy and creativity of nongovernmental actors, including the private sector.

The United States has no such strategy. Sustainable development is not actively supported by the president or congressional leaders. There is no strategic thinking or action on behalf of the Federal Government. There is no governmental coordinating or implementing mechanism for a national strategy, and little public education.

The PCSD (1993–1999), an advisory council established by President Clinton, might have provided (and, if resurrected, could still provide) the basis for a national strategy. The PCSD brought together diverse stakeholders from around the country and fashioned a detailed set of recommendations for sustainable development in the United States. But it had no authority to implement its own recommendations, and neither President Clinton nor Vice President Al Gore showed interest in seeking implementation. Nor was there much interest in Congress during the same period.

The Council on Environmental Quality (CEQ), which until 1995 was required to issue national reports on the state of the nation's environment, has not issued such reviews on a regular basis for years. On the other hand, a 1993 statute, the Government Performance and Results Act (GPRA), requires Federal agencies to engage in a strategic planning process, and some agencies have used sustainable development to guide that process.

The United States should adopt and implement a national strategy for sustainable development. It should include meaningful goals, indicators of progress toward those goals, legal and institutional mechanisms for achieving them, and public edu-

cation. The strategy should be built on existing laws and legal authority, and thus should ensure wider use of the GPRA to move agency planning toward sustainable development. It should prioritize those issues that are of greatest importance. Some executive level entity, perhaps the CEQ, should be responsible for coordinating its development and implementation. But CEQ's now-extinguished annual reporting function should be transferred to an independent and properly funded entity, either in or out of the Federal Government. That would help ensure that a long-term perspective is brought to bear in national decisionmaking-one of the most important prerequisites for sustainable development.

The international community would add significant value to the national sustainable development strategy process if countries were to agree that implementation of national sustainable development strategies should begin no later than 2005. It would also help if countries would agree that national trends for the degradation and loss of natural resources should be reversed by 2015. Such goals would give more specific content to the national strategy process, and would also incorporate a specific and easily understood goal into the meaning of sustainable development. This goal would help focus national and international efforts, and would help galvanize citizens, NGO's, and corporations in countries around the world.

Looking Ahead

A defining characteristic of a sustainable society is that it can successfully adapt to new and different conditions. We have grown and prospered as a Nation because we have been able to take advantage of opportunities and respond to threats that our founders could not have imagined. The challenges of growing global environmental degradation, and the growing gap between rich and poor are quite obvious. But the opportunity is equally real-to build an ecologically sustainable framework that provides greater freedom, opportunity, and quality of life for all. Law and policies are not the only means of achieving a sustainable society, but they will play an important role.

The essential missing ingredient thus far, and which needs to be supplied in the coming decade, is commitment-commitment by government at all levels, educational institutions, business and industry, NGO's, and individuals. We know what we need to do, and we also know why. As Americans, we are called to face these challenges, and to seize this opportunity.

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