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THE CURRENT AND FUTURE ROLE OF SCIENCE IN THE ASIA-PACIFIC PARTNERSHIP

HEARING

BEFORE THE

SUBCOMMITTEE ON GLOBAL CLIMATE CHANGE AND IMPACTS

OF THE

COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION
UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

APRIL 5, 2006

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ONE HUNDRED NINTH CONGRESS

SECOND SESSION

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THE CURRENT AND FUTURE ROLE OF SCIENCE IN THE ASIA-PACIFIC PARTNERSHIP

WEDNESDAY, APRIL 5, 2006

U.S. SENATE,
SUBCOMMITTEE ON GLOBAL CLIMATE CHANGE AND IMPACTS,
COMMITTEE ON COMMERCE, SCIENCE, AND TRANSPORTATION,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:34 p.m. in room SD–562, Dirksen Senate Office Building, Hon. David Vitter, Chairman of the Subcommittee, presiding.

OPENING STATEMENT OF HON. DAVID VITTER, U.S. SENATOR FROM LOUISIANA

Senator VITTER. The hearing will come to order.

I would like to thank Senators Stevens and McCain and Chairman Connaughton for being here today for this Subcommittee's hearing.

The topic of our hearing is the current and future role of science in the Asia-Pacific Partnership. I called for this hearing to learn more about the partnership and how the initiative is integrated with an estimated $5 billion in other climate-related initiatives the Federal Government undertakes annually.

The Administration announced the partnership last summer, and, together with the other nations, met in Australia in January of this year to begin the implementation of this multilateral initiative. The President requested $52 million in his FY07 budget request for this Asia-Pacific Partnership. This request includes funds for the Departments of Commerce, State, Energy, and the EPA. Each of these agencies is also involved with the Climate Change Science Program and the Climate Change Technology Program, where, again, we spend significant amounts annually.

I want to thank the Administration for taking on this initiative and working strongly on the goals of the Partnership. Within the next few years, greenhouse gas emissions from developing nations will surpass those of all industrialized countries combined. So, this sort of initiative, global in nature, is going to be absolutely necessary to properly address any of these issues.

It's my understanding, for instance, that China plans to meet its skyrocketing energy demands with nearly 800 coal-fired power plants without the benefit of clean coal or gasification technologies. Of course, this undermines global efforts to reduce greenhouse gas emissions, and certainly confirms the wisdom of this sort of partnership, which is global in nature. In addition to the mandatory nature of the Kyoto protocol, the disparity in the treatment of in-

dustrialized versus developing nations under Kyoto, in my view, is a fundamental flaw.

My primary concern here today is to ensure that our national climate strategy is a coordinated, productive one. I want to ensure that the taxpayers are getting every penny out of the Federal investment being made in climate change. And I look forward to hearing from our witnesses today to learn more on this topic and other recommendations to improve our national strategy from the panels today.

With that, I'd invite the Chairman of the full Committee to make any opening statements.

OK. Senator McCain, you were apparently here first. Why don't you make any opening statements——

STATEMENT OF HON. JOHN McCAIN, U.S. SENATOR FROM ARIZONA

Senator McCAIN. I thank you very much, Mr. Chairman. I applaud your efforts to review the role of science in the administration's Asia-Pacific Partnership.

We all recognize that the solution to the climate change problems will involve the use of many new technologies. The flow of scientific reports concerning the impacts of climate change has been continuous and voluminous. It highlights a number of critical concerns for people, not only in the Arctic region, but for people around the globe.

As we look to the future, the need for effective adaptation strategies and technologies will become greater. It's not enough that we do scientific study after study; we've got to prepare the country and the world for the onset of more severe and damaging impacts of climate change. Thus far, much of the attention have been on mitigation. I think we look—got to look at adaptation, especially if we continue to fail in our effort to mitigate the effects of global warming.

I recently went to New Orleans to visit, at the invitation of the distinguished Chairman, and it's clear that levees alone won't do the job. The barrier islands have been dramatically decreased, and that has a great deal to do with the effects of climate change.

TIME magazine recently issued a special report on climate change. The report highlights the damage that rising global temperatures are inflicting on our planet. The damage ranges from increased droughts, like the one we're experiencing in Arizona, to melting polar caps, melting glaciers, rising sea levels, increased forest fires, and species migration. I recommend that my colleagues take the opportunity to review and consider the implications of the report.

Mr. Chairman, I'd like my complete statement to be part of the record.

[The prepared statement of Senator McCain follows:]

PREPARED STATEMENT OF HON. JOHN McCAIN, U.S. SENATOR FROM ARIZONA

Thank you Mr. Chairman for calling today's hearing. I applaud your efforts to review the role of science in the Administration's Asia-Pacific Partnership. I know that the Administration has placed great emphasis on the future on this program.

I think we all recognize that the solution to the climate change problem will involve the use of many new technologies. Though this partnership is part of the solution, it alone is not enough.

Mr. Chairman, the flow of scientific reports concerning the impacts of climate change has been continuous and voluminous. It highlights a number of critical concerns for people not only in the Arctic region, but for people around the globe.

As we look to the future, the need for effective adaptation strategies and technologies will become greater. It's not enough that we do scientific study after study. We must also prepare the country and the world for the onset of more severe and damaging impacts of climate change. Thus far, much of the attention has been on mitigation. Now, we must also start to look at adaptation—especially if we continue to fail in our effort to mitigate the effects of global warming.

TIME magazine recently issued a special report on climate change. The report highlights the damage that rising global temperatures are inflicting on our planet. The damage ranges from increased droughts—much like the one we are experiencing in Arizona, to melting polar caps, melting glaciers, rising sea levels, increased forest fires, and species migration. I recommend that my colleagues take the opportunity to review and consider the implications of the report.

The cover of the issue shows a polar bear as it tries to negotiate what was once solid ice. Because of the disappearing ice floats, many polar bears are drowning. The U.S. Fish and Wildlife Service announced on February 8, that it has opened the formal process for listing polar bears as "threatened" under the Endangered Species Act because of this phenomenon.

The *TIME* article reports that 85 percent of respondents to a recent TIME/ABC News/Stanford University poll agree that global warming probably is happening, and 87 percent believe the government should either encourage or require lowering of power plants emissions. In addition, 85 percent think something should be done to get cars to use less gasoline.

This is a huge public outcry for action from our government. Yet, the Administration continues to support a voluntary approach. This simply will not work, nor will it deliver the type of response needed to address this pending environmental catastrophe. I know the climate change discussions continue in the Senate. However, discussion alone will not get it done. We must have meaningful and effective action.

As these discussions continue, let me also remind my friends that climate change is an environmental problem with economic constraints, and not an economic problem with environmental constraints. The climate system will respond to reduced greenhouse gas emissions, but not to emission intensity ratios.

Again, Mr. Chairman, I thank you for this hearing today and as you can see there are many issues to be discussed. I welcome our witnesses here today and look forward to their testimony.

Senator MCCAIN. And just let me conclude by saying I continue to be deeply disappointed at the total lack of concrete actions taken by the Administration. Mr. Connaughton, I admire your courage for coming here. I talk about studies. We'll talk about goals and efforts. You've done nothing, and it's disgraceful what you haven't done. And it's disgraceful that we are going to lay a very, very serious problem on our children because of our failure to address this issue with any seriousness whatsoever.

We'll have witnesses, funded by ExxonMobil and others, who will tell you that climate change isn't real, that we don't have to worry about it. The fact is that we have done a terrible, terrible thing to future generations of Americans because of our failure to act in light of overwhelming evidence that argues that we act immediately and drastically to try to reverse this terrible affliction that our planet is experiencing, which, in the view of some, may be approaching the point of being irreversible.

One of my deepest regrets is the failure of the Administration to do anything concrete to address this issue, besides platitudes and studies.

I thank you, Mr. Chairman.

Senator VITTER. Chairman of the full Committee, would you like to make an opening statement?

STATEMENT OF HON. TED STEVENS, U.S. SENATOR FROM ALASKA

The CHAIRMAN. Mr. Chairman, I thank you. And thank Senator McCain for his comments.

I feel there already is an Asia-Pacific Partnership in the International Arctic Research Center. That's being funded now by a series of nations. And, certainly, it's headquartered in my State, for an obvious reason. Some people have said that Alaska is sort of the canary in the mine, as far as the basic concept of climate change. And we are experiencing enormous change threatening our native villages. I'd like to point out that we're working very hard to help people in—that were in the path of Rita and Katrina, but we had a near typhoon off of our shores up there. We had nine villages almost destroyed, 19 were very seriously damaged. We're still waiting for the money to be allocated. We're still waiting for their help, and it's almost—you know, over a year ago that took place.

I do think that not only should we be helping them, you know, to relocate their villages—and most of them live on barrier islands, and they're—no longer have access to the mainland, in some instances. Their airports are flooding. In the event of another disaster of the same type, we wouldn't be able to evacuate them if their airports flood, because there are no roads out of those places anymore.

There are a lot of things we should be doing. But I think we should take the changes very seriously, and look at the causes and effects in our State. I personally showed the President a chart yesterday of the difference between Arctic Ocean in the 1970s and Arctic Ocean in the 1990s, in terms of heat distribution, and it shows very clearly that there has been an enormous amount of heat that has entered the Arctic Ocean from the Atlantic. And the North—the heat in the North Atlantic, which our people believe came from very active sunspots, really has a lot to do with this change, but we're not spending much time trying to determine, really, is there anything we could do about it.

I do think, Senator, we could do a few more studies to find out what really is causing the permafrost to be, you know, less thick. And we now know why the Arctic ice cap is shifting around; it's because of the currents coming in from the North Atlantic.

But I've got to tell you, Asia-Pacific Partnership, at $52 million, may be a good deal. I don't know. But I know that cutting the money for the International Arctic Research Center, cutting the money for the Alaska Volcano Observatory—we've got one volcano, as you know, still spewing out, and yet we're not going to monitor it anymore? I really think that something has to be done to look at the allocation of funds, and really support the kind of action that's necessary in order to try to—to know more clearly what's going to happen. It's the prediction of what's going to happen.

Yesterday, as I understand it, the Weather Bureau told us we should get ready for another series of hurricanes in the southern States. Clearly, there's a role for more action than we see. And I'm

sorry I can't stay and be with you. I would have had some specific questions.

I would urge you to take the time and sit down with a group of us and see if there isn't some way that we can get better response to what we perceive to be the needs not only of research, but also of action to try to prevent any further damage to some of those villages, for instance. There's no reason why we should not understand that they have a right just to have some action taken, just as the people of New Orleans and people that lived within the Katrina-affected area do. But——

So, I thank you for your statement. I will read it in full. But I share some of my colleagues feelings about this.

Thank you very much.

Senator VITTER. Senator Lautenberg is the Ranking Member of this Subcommittee. Senator, do you have an opening statement?

STATEMENT OF HON. FRANK R. LAUTENBERG, U.S. SENATOR FROM NEW JERSEY

Senator LAUTENBERG. Thanks, Mr. Chairman.

I'm pleased that we're having this review right now, because the problems are upon us. And at what point we decide that there's serious danger, near ahead, that we get going? And I'm pleased to see Mr. Connaughton here and have a chance to review this together.

Global warming, which I see as the thing that we want to get going about, concerns the whole world, especially concerns the States, Mr. Chairman, that you and I represent, and Senator Stevens, as well. And our States are threatened by hurricanes and rising sea levels, coastal erosion. And in our States, tourism and fishing industry make significant contributions to the States' economy.

Now, we've got witnesses here today, distinguished witnesses, and I look forward to hearing their views on the Asia-Pacific Partnership.

However, I want to say, at this point, statements about global warming from the Administration have to be taken with a grain of salt. When George W. Bush was running for President the first time, he promised that he would support legislation to combat global warming by limiting carbon emissions from power plants. Once he took office, the silence fell. And since then, the Bush Administration's record on global warming has been consistent. Unfortunately, it's been consistently wrong. For 5 years, the Administration has dragged its feet on global warming, all the while insisting that there was no scientific consensus about whether or not action was needed.

Now, we know that there has been rewriting on scientific findings at the White House to insert doubt where there was none intended by its authors. But they've censored career scientists, prevented them from speaking to the press, talking to the public about their views on their areas of expertise. They've allowed our Nation's energy policy to be dictated by oil, power companies that have the most to gain from being allowed to continue emissions of greenhouse gases, while shutting out those who have the most to lose; and that is the American people.

They've even tried to block States from taking action to reduce vehicle emissions of greenhouse gases. And now the American people are being told that voluntary controls of greenhouse gases will be sufficient to ward off the effects of global warming.

Mr. Chairman, *TIME* magazine recently did a cover story about global warming. The story makes clear that the debate about global warming is over. It is now time for action. There's a broad consensus among scientists around the world that global warming is occurring, that it's caused by human activity. There's also increasing alarm that unless we act quickly, it might be too late to avoid catastrophic effects from global warming.

The clock is running. Our window of opportunity to address global warming is rapidly closing. The longer we wait to take meaningful steps, the more costly these steps will be when we finally do take them. And I'm not here to attack the merits of working jointly with other countries, absolutely—on developing technologies to help reduce emissions of greenhouse gases. Certainly, science and technology must play a central role in reducing these greenhouse emissions. But we need to seriously consider whether the Administration's response to global warming even begins to approach what we should be doing about a problem that threatens our entire planet.

And, once again, I really do encourage us to work with other countries to see if we can do it. In particular, the focus here is on the Pacific area, and it should be, and especially listening to what Senator Stevens said about the change—the obvious change in temperature. At what point do we look outside and see snow disappearing in places, glacier—Glacier National Park, substantial reduction in the number of glaciers; Kilimanjaro, substantial reduction of the snow on top of the mountain—at what point do we say, "Hey, we see it. How come we don't believe it?"

Mr. Chairman, thanks very much for holding this hearing. I look forward to hearing from our witness.

Senator VITTER. Thank you, Senator.

On the first panel today, we have the Honorable Jim Connaughton, Chairman of the Council of Environmental Quality at the White House.

Jim, thanks for being here today, and we appreciate you taking the time to come up and testify on the Asia-Pacific Partnership.

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

Mr. CONNAUGHTON. Thank you, Mr. Chairman. Thank you, Senator Lautenberg, Senator McCain.

It's my pleasure to be here today to talk about the Asia-Pacific Partnership, and to talk about it in the context of many of the remarks that you just made in your opening statements.

The Asia-Pacific Partnership on Clean Development and Climate was announced last year, last summer, and launched in January by President Bush and the leaders of Australia, China, India, Japan, and South Korea. Now, this is a public-private initiative that is establishing an innovative—and, actually, first-ever—collaboration of its type for addressing the interconnected challenges of assuring economic growth and development and poverty eradication in the context of addressing three combined goals: energy se-

curity, air pollution reduction, and mitigating the greenhouse gases associated with long-term climate change.

What I want to do is give you a few essential concepts to the partnership, talk a little bit about the mechanics, and then just discuss very briefly the budgeting.

On the essential concepts, first of all, I think it is well recognized that strong and growing economies are essential to making progress on all of these important issues—security, pollution reduction, and climate change—because it's only through economic growth that we have the wherewithal, the financial resources, to make the investments in the transformational energy technologies that produce the results that we all desire.

And, for all three members of the panel that are here right now, I think there's raging consensus on forward progress. There's raging consensus on the seriousness of these three issues and the need for taking action. And so, really, what the discussion has to be about is the various ways in which we can make substantial progress in the near-term, the mid-term, and the long-term.

Another important theme is this notion of integration. We have found that looking at greenhouse gases in isolation is a mistake. It's very important to look at the real-term health consequences of good old-fashioned air pollution, especially from fossil-fuel energy generation, also in the context of each of our countries' imperatives of making—ensuring that we have security of our energy supply, upon which our livelihoods depend.

A fourth theme, then, is this need—I'm sorry—third theme is the need for private-sector engagement. Government doesn't make this happen. It is actually a massive investment. We're talking about hundreds of billions and trillions of dollars of investment by the private sector that is what delivers the outcomes that we all share. And we have to engage the private sector in a way that is consistent with the way they do business in delivering good, clean technologies into not just marketplaces such as the U.S. and Japan, but getting them mass-produced and entered into marketplaces such as China and India.

And then, fourth, any approach has to be a portfolio approach. And, by that, it's a combination of mandatory measures, voluntary measures, and partnerships. And I would take issue with the characterization of what's occurring here or anywhere else in the world as one or the other. That's actually a false dichotomy. Each country that is working aggressively on this issue of climate change is working aggressively through a portfolio of measures, as I described.

Now, in terms of the mechanics of the Partnership, the Partnership is directly in response to Title XVI of the Energy Policy Act of 2005 that enjoyed very substantial bipartisan support. It called for just this kind of action.

These six countries represent 50 percent of the world's population, 50 percent of the world's economy, and 50 percent of the world's fossil-fuel energy use and greenhouse gas emissions. It is a very important configuration of countries.

We are united with our partners in recognizing that this requires not just a portfolio of actions, but also a portfolio of actors. For example, the United States, we have the Departments of State, En-

ergy, Commerce, and the Environmental Protection Agency with leading roles in the partnership, but they will be supported by departments such as the Department of Transportation, the Department of Agriculture, and, most importantly, by our financing institutions, such as the Export-Import Bank and the Asia Development Bank.

I was pleased to be in Sidney, Australia, for the launch of the partnership, which was hosted by Prime Minister Howard. To give you a sense of how important it was, China sent their number-five official to this discussion. We have found a way to engage China, which is something that has been elusive for over a decade. And we are working through eight different task forces, which are detailed in some length in my written testimony—eight task forces that are the ones that matter, the big, energy-intensive industry sectors, such as cement, steel, power generation, renewable- and distributed-energy generation, and, importantly, households and appliances—buildings and appliances. These task forces are going to be organized on a public-private basis to create the information flows that enable us to accelerate market-based investments in technology opportunities.

If you would, Mr. Chairman, I just want to give one example of the kind of thing we're talking about, to make it very specific.

In the U.S., over the last 10 years, we have, through a great partnership organized by EPA, working with the Department of Energy, gone after methane emissions from coal mining, and from landfills, and from leaky natural gas production and distribution systems. This effort is a profitable enterprise, and we've done hundreds of projects, billions of dollars have been spent, and we have actually reduced our methane emissions. Methane is a safety hazard. It's an air pollutant that contributes to ozone. And it's a potent greenhouse gas, 20 times more powerful than CO_2. Now, this has been done at a profit, with great success.

China and India largely don't do this right now. Something we can achieve through this partnership is to sit down with the leadership of China and India and several of the other countries and put on the table the hundreds—and I actually think it's thousands—of methane projects that could occur tomorrow with existing technology, at a profit. That's just something that hasn't happened. And that's what this partnership is going to be able to achieve, to put together those networks of investors, of technology providers, and policymakers, to produce an outcome on that scale.

We can expect—we have a Methane to Markets Partnership, that preceded the Asia-Pacific Partnership, that, when successful, will cut greenhouse gas emissions by about 42 million metric tons. That one program alone is about a tenth of what the countries doing Kyoto would achieve if they met their targets. So, I just want to give you a sense of the scale of what we're talking about, and the nature of what we hope to achieve. And that's why the budget is important. These agencies need the resources to be able to enable these networks and unleash billions of dollars of private-sector investment. That's a very good use of taxpayer resources. And it comes out of our already substantial $5 billion climate budget.

So, thank you, Mr. Chairman. Thank you, Senator Lautenberg. And I look forward to your questions.

[The prepared statement of Mr. Connaughton follows:]

PREPARED STATEMENT OF HON. JAMES L. CONNAUGHTON, CHAIRMAN, WHITE HOUSE COUNCIL ON ENVIRONMENTAL QUALITY

Mr. Chairman, thank you for inviting me to testify today on the Asia-Pacific Partnership on Clean Development and Climate, announced last year and launched in January by President Bush and the leaders of Australia, China, India, Japan, and South Korea. This public-private initiative establishes an innovative collaboration for addressing the interconnected challenges of assuring economic growth and development, poverty eradication, energy security, pollution reduction, and mitigating climate change.

Shortly before the G8 meeting last year in Gleneagles, Scotland, President Bush said:

> The best way to help nations develop while limiting pollution and improving public health is to promote technologies for generating energy that are clean, affordable and secure. Some have suggested the best solution to environmental challenges and climate change is to oppose development and put the world on an energy diet. But at this moment, about two billion people have no access to any form of modern energy. Blocking that access would condemn them to permanent poverty, disease, high infant mortality, polluted water and polluted air.
>
> We're taking a better approach. In the last 3 years, the United States has launched a series of initiatives to help developing countries adopt new energy sources, from cleaner use of coal to hydrogen vehicles, to solar and wind power, to the production of clean-burning methane, to less-polluting power plants. And we continue to look for more opportunities to deepen our partnerships with developing nations. The whole world benefits when developing nations have the best and latest energy technologies.[1]

Over the past 4 years, the Bush Administration has been building the structure of a more constructive, practical and realistic approach to international action on clean development and climate change. In February 2002, the President announced a comprehensive domestic and international strategy for addressing the serious, long-term challenge of global climate change through the development and widespread deployment of the best of current technologies and transformational new ones.[2] This strategy is producing real results.

In 2002, the President set a national goal of reducing the greenhouse gas intensity in the U.S. economy by 18 percent by 2012. We are committed to the logical steps of first slowing the growth of emissions per unit of GDP and, as the science justifies, stopping and then reversing emissions. We have established strong partnerships for action with the private sector, through programs such as the Department of Energy's Climate VISION program and the Environmental Protection Agency's Climate Leaders program. We have taken the lead internationally on transformational technology development initiatives such as the Hydrogen Fuel Initiative, which will accelerate the future of an emissions-free hydrogen transportation system, and FutureGen, a project to create the world's first coal-based zero-emissions electricity and hydrogen power plant.[3] Our wide variety of technology-based programs are being managed by the Climate Change Technology Program through the Department of Energy.

Nearly every major provision of the Energy Policy Act of 2005 is helping to advance Presidential priorities for cleaner, more efficient, and less greenhouse gas-intensive energy systems, including incentives for production of wind, geothermal and solar power, consumer tax credits for highly fuel-efficient hybrid and clean diesel vehicles, clean coal technology, emissions-free nuclear power, and renewable biofuels.

In addition to voluntary actions and incentives, the President's strategy takes advantage of new mandatory efficiency and renewable fuels standards in the energy

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[1] *http://www.whitehouse.gov/news/releases/2005/06/20050630.html.*

[2] Discussions of these various programs can be found on the following websites:
The White House (*http://www.whitehouse.gov/news/releases/2002/02/climatechange.html*);
Department of Energy (*http://www.energy.gov/environment/climatechange.htm*);
Department of State (*http://usinfo.state.gov/gi/global_issues/climate_change.html*);
Department of Agriculture (*http://www.ers.usda.gov/Briefing/GlobalClimate/*); and
Environmental Protection Agency (*http://yosemite.epa.gov/oar/globalwarming.nsf/content/Climate.html*).

[3] *http://www.fe.doe.gov/programs/powersystems/futuregen/.*

bill. Innovative new fuel economy regulations will save 10.7 billion gallons of fuel and include, for the first time ever, the largest sport utility vehicles and Hummers.

And we are moving forward to carry out the President's State of the Union vision to break our addiction to foreign oil through new technologies and to change the way we power our homes and offices.

These new domestic programs and authorities will help us maintain the steady progress we have made in recent years toward the President's greenhouse intensity goal. [*Charts 1&2*] Between 2000 and 2004, the U.S. economy grew 9.6 percent while greenhouse gas emissions increased only 1.1 percent.[4,5] These reductions come from a combination of: (1) desirable improvements in efficiency and deployment of advanced energy technologies and practices, (2) a desirable structural expansion of our economy to lower-emitting manufacturing and service industries and enterprises, (3) the undesirable economic slowdown a few years ago, and (4) the undesirable shift of higher-emitting energy intensive industries and jobs to other countries with significantly lower energy costs. This last factor is problematic enough from the standpoint of those who lost jobs. As important, it probably did not produce an actual environmental benefit, as the air pollution and greenhouse gases emissions simply shifted to the other countries along with the jobs. The President's policies are directed at accelerating the results from the first two factors, while guarding against the unsustainable or false sense of progress associated with the second two factors.

As we seek to reduce our own emissions intensity, other fast growing economies of the world have significant opportunities to substantially reduce their emissions intensity. In his June 2001 and February 2002 climate change policy speeches, President Bush highlighted the importance of international cooperation in developing an effective and efficient response to the complex and long-term challenge of climate change.[6] The international cooperation and investment that Title XVI of the Energy Policy Act of 2005 authorizes is essential to ongoing progress globally. Data collected by the Energy Information Administration reinforces the importance of continued partnership among mature and emerging economies on energy technology development and deployment. By 2010, carbon dioxide emissions from emerging economies, such as China and India, will surpass those from mature market economies like the United States.[7] [*Chart 3*]

That is why, last summer, the Administration introduced our most recent and consequential multilateral initiative, the Asia-Pacific Partnership for Clean Development and Climate. The six major nations in this partnership—Australia, China, India, Japan, South Korea, and the United States—account for about half of the world's economy, energy use, and greenhouse gas emissions. In announcing the Asia-Pacific Partnership on July 27, 2005, President Bush said:

> This new results-oriented partnership will allow our nations to develop and accelerate deployment of cleaner, more efficient energy technologies to meet national pollution reduction, energy security, and climate change concerns in ways that reduce poverty and promote economic development.

The Partnership's vision statement, which is attached, identifies a broad range of near-and longterm technologies and practices that are designed to improve energy security, reduce pollution and address the long-term challenge of climate change. The Partnership focuses on voluntary practical measures to create new investment opportunities, build local capacity, and remove barriers to the introduction of cleaner, more efficient technologies. It is important to build on mutual interests and provide incentives to tackle shared global challenges such as climate change effectively.

We are united with our partners in recognizing that the ingenuity and energy of the private sector is crucial to our success in addressing these issues over time. This effort cannot succeed without strong private sector involvement. The Departments of State, Energy, Commerce, the Environmental Protection Agency, and other agencies and financing institutions, such as the Export-Import Bank and Asian Development Bank, are actively discussing ways of ensuring that the private sector is engaged in a meaningful way in the Partnership at every stage of its work.

This past January, I was privileged to join Energy Secretary Sam Bodman and Under Secretary of State Paula Dobriansky at the first Ministerial meeting of the Partnership in Sydney, Australia. The meeting was hosted by Australian Prime

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[4] *http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissionsUSEmissionsInventory2006.html.*

[5] *http://www.bea.gov/bea/dn/home/gdp.htm.*

[6] *http://www.whitehouse.gov/news/releases/2001/06/20010611-2.html* and 3http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html.

[7] Energy Information Administration, International Energy Outlook, 2005.

Minister John Howard and chaired by Australian Foreign Minister Alexander Downer. In addition to involving unusually high-ranking government official representation, the meeting also included a substantive dialogue with leading CEOs and heads of industrial organizations from each country representing some of the most significant, energy-intensive and emitting sectors.

The Ministerial established a Policy and Implementation Committee and its first set of Task Forces covering actions in eight areas:

- Cleaner Fossil Energy
- Renewable Energy and Distributed Generation
- Power Generation and Transmission
- Steel
- Aluminum
- Cement
- Coal Mining
- Buildings and Appliance

Each Task Force has a government Chair and Co-Chair. [*Chart 4*] The United States will chair the Policy and Implementation Committee and Chair or Co-Chair three of the Task Forces. Initial details about the objectives and work plans for each task force are outlined in the accompanying charts. [*Charts 5.1–5.8*] We anticipate each Task Force to consist of two senior government officials and two private sector leaders from each country to enable a relatively manageable planning and implementation dialogue of about 24 people per Task Force. The United States Task Force members include participants from government agencies, major companies, and nonprofit organizations.

In a few weeks, the United States will host the first Task Force working meetings. The Task Forces currently vary in their level of organization and planning. The aluminum sector, for example, has already adopted a Memorandum of Understanding as to how they intend to proceed. This is not surprising, as this sector is already well-organized internationally and involves large multi-national companies. On the other hand, sectors such as cement and power generation are composed predominantly of domestic companies, that infrequently, if ever, have had reason to get together and share management strategies, relevant sector goals, best practices, technologies and financing arrangements. For many, the Asia-Pacific Partnership will afford the first opportunity for such hands-on, senior-level exchanges.

At the first working group meetings and in the months that follow, we expect the Partners to develop a broad portfolio of shared goals and objectives. Let me outline a few of my own personal thoughts concerning the kinds of deliverables the Task Forces will explore.

A principal, operational objective of the Partnership is to identify profitable technology investment opportunities and outcomes in each partner country. While there may be discussion of "demonstration projects" related to emerging technologies in each sector, we are placing a strong emphasis on identifying opportunities for near-term outcomes that can be "mass-produced" using tried-and-true technologies and methods.

For example, methane capture from coal mining is a well-established and highly profitable practice in the United States that nets significant benefits in terms of worker safety, harmful pollution reduction, and mitigation of a greenhouse gas that is 20 times more potent than carbon dioxide. The potential number of such projects in several of the other partner countries is quite high. Our partner countries also have a strong interest in our substantial experience and success in improving the efficiency and capacity of our power generation. Out of such discussions should emerge a fairly concrete list of information, policy, economic, and regulatory barriers to such investment and corresponding actions to address such barriers.

To give another example, in order to comply with our new Clean Air Interstate Rule mandating about a 70 percent reduction in harmful air pollution, our power generation utilities are projected to invest about $50 billion to install and operate pollution controls and efficiency improvements at existing and new plants.[8] Details of this rule and the market it will expand for current and new technologies are largely unknown to our partner countries, who may want to replicate it back home or produce innovative control technologies that can be marketed to our power sector. Similarly, according to recent reports, China has announced a commitment to improve the efficiency of its power generation by 20 percent by 2010 and to cut the sulfur-dioxide emissions from a significant portion of its power plants. This remark-

[8] *http://www.epa.gov/cleanairinterstaterule/.*

ably ambitious objective will create another strong market force for new investment in technologies and services.

Another opportunity is the prospect of a better, shared inventory of each country's capabilities and commitments in key sectors. For example, Japan has a highly-evolved, voluntary program of greenhouse gas mitigation goal-setting and implementation involving each of its major emitting sectors. President Bush's Climate VISION and Climate Leaders programs share common elements with the Japanese program.[9] Closer alignment and amplification of these approaches, while ensuring their relevance to each country's national circumstances, would be very valuable.

Another area of importance is the potential for further development of capacity to accurately monitor and measure performance across a number of metrics and sectors. While at different points on the continuum, each of the six countries is working aggressively to improve its ability to track improvements in efficiency, air quality and greenhouse gas emissions. Such capacity is essential to ensuring integrity, consistency, and cost-effectiveness of results.

Finally, we are working to ensure the focused and active engagement of public and private financing institutions. The operational success of this effort should be measured not by how much governments and their taxpayers spend on the effort, but on how much new private sector investment and financing can be unleashed and accelerated to achieve partnership security and environmental performance goals. The U.S. Department of Commerce and our Export-Import Bank are already working on business plans and trade promotion exchanges focused on Partnership priorities. And the head of the Asian Development Bank participated in the Ministerial launch of the Partnership in Australia.

The Asia-Pacific Partnership and our other international engagements on climate change center on five key ideas, all of which extend from and build on our own experience here in the United States. First, a successful international response to climate change requires developing country participation, which includes both near-term efforts to slow the growth in emissions and longer-term efforts to build capacity for future cooperative actions. Absent the participation of all major emitters, including developing countries, the goal of stabilizing GHG concentrations will remain elusive.

Second, we will make more progress on this issue over time if we recognize that climate change goals fall within a broader development agenda—one that promotes economic growth, reduces poverty, provides access to modern sanitation and clean water, enhances agricultural productivity, provides energy security, reduces pollution, *and* mitigates greenhouse gas emissions. Countries do not look at individual development goals in a vacuum, and approaches that effectively integrate both near- and longer-term goals will yield more benefits over time.

Third, technology is the glue that can bind these development objectives together. By promoting not just the development but also the wide spread commercialization and use of cleaner and more efficient technologies, we can meet a range of diverse development and climate objectives simultaneously.

Fourth, we need to pursue our international efforts in a spirit of collaboration, not coercion, and with a true sense of partnership. This is especially true in our relations with developing countries, which have an imperative to grow their economies and provide for the welfare of their citizens. Experience has shown these countries to be quite skeptical of climate mitigation approaches that they think will divert them from these fundamental goals. It is also true that many of the largest greenhouse gas emitters are also among our most significant trading partners. They have rapidly advancing—in many cases, world class—industries and considerable technical wherewithal. We view countries like China and India as responsible partners in our efforts.

Finally, we need to engage the private sector to be successful. While the right kind of government-to-government collaboration can pave the way for great progress, we will need to harness the ingenuity, resources and vision of the private sector in developing and deploying technology.

The President's FY07 budget calls for $52 million to support the work of the Partnership. The request is divided among the Departments of State, Energy and Commerce, and the Environmental Protection Agency. Other agencies, such as the Departments of Transportation and Agriculture, will also be participating. The Partnership is a team effort and requires a team budget.

In addition to the Asia-Pacific Partnership, since 2001, we have established a range of partnerships that will address key aspects of the climate challenge while also advancing other important international objectives. We have established bilateral climate partnerships with 15 countries and regional organizations that, to-

[9] *http://www.climatevision.gov/.*

gether with us, comprise some eighty percent of global greenhouse gas emissions. These partnerships serve as the umbrella for over 400 collaborative activities undertaken by U.S. agencies and their partners on science, technology and policy issues. Through these partnerships, U.S. experts are working with Australia and New Zealand to strengthen our capacity to monitor climate in the Pacific; with India to promote local-level pollution and energy solutions that will have greenhouse gas intensity benefits; with Brazil to promote effective application of renewable energy; with Japan and Korea to promote greater integration of climate and energy strategies throughout Asia; and with China to enhance technical capacity for climate-related decisionmaking.

In addition to our bilateral partnerships, we have initiated and participate in a range of new technology initiatives designed to meet climate and clean development goals. Let me briefly highlight a few of the most significant partnerships:

- *Group on Earth Observations*:[10] On July 31, 2003, the United States hosted 33 nations—including many developing nations—at the inaugural Earth Observation Summit (EOS), out of which came a commitment to establish an intergovernmental, comprehensive, coordinated, and sustained Earth observation system. The climate applications of the data collected by the system include the use of the data to create better climate models, to improve our knowledge of the behavior of carbon dioxide and aerosols in the atmosphere, and to develop strategies for carbon sequestration. The United States was instrumental in drafting a ten-year implementation plan for a Global Earth Observation System of Systems, which was approved by 55 nations and the European Commission at the 3rd EOS summit in Brussels in February 2005. The United States also released its contribution through the Strategic Plan for the U.S. Integrated Earth Observing System in April 2005.[11] The plan will help coordinate a wide range of environmental monitoring platforms, resources, and networks.
- *International Energy Research and Development Partnerships: The Generation IV Nuclear partnership,*[12] *the Carbon Sequestration Leadership Forum*,[13] *the International Partnership for the Hydrogen Economy*,[14] and *ITER*.[15] In the last 4 years, the Administration has engaged in four partnerships that lend new international emphasis to strategic technologies that can make a large contribution to our efforts to reduce greenhouse gas intensity and diversify the global energy portfolio. The State Department is working closely with DOE to engage our partners, and all of these partnerships include key developing countries as full partners in our efforts to advance these important technologies—an important capacity building function that will also serve to promote the growth of global markets.
- *The Methane to Markets Partnership*:[16] This Partnership, launched in November of 2004, focuses on advancing cost-effective, near-term methane recovery and use as a clean energy source to enhance economic growth, promote energy security, improve the environment, and reduce greenhouse gases. At the recent session, the partnership welcomed its seventeenth member, Ecuador, and now represents over 60 percent of global methane emissions. This Partnership includes an extensive project network comprised of 190 private sector, governmental and non-governmental organizations. Methane to Markets currently targets four major methane sources: landfills, underground coal mines, natural gas and oil systems, and animal waste management. By 2015, the Partnership has the potential to deliver annual reductions in methane emissions of up to 50 million metric tons of carbon equivalent or recovery of 500 billion cubic feet of natural gas.
- *World Summit on Sustainable Development Partnerships*:[17] The United States has been at the forefront of efforts to move multilateral bodies toward a practical, results-focused actions centered around partnerships among governments, businesses and other organizations. Among over 20 U.S.-initiated partnerships

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[10] *http://earthobservations.org/.*
[11] *http://iwgeo.ssc.nasa.gov/docs/EOCStrategic_Plan.pdf.*
[12] *http://www.nei.org/index.asp?catnum=3&catid=1215.*
[13] *http://www.cslforum.org/.*
[14] *http://www.iphe.net/.*
[15] *http://www.iter.org/.*
[16] *http://www.epa.gov/methanetomarkets/* and *http://www.methanetomarkets.org/*. Founding Methane to Markets member governments include the United States, Argentina, Australia, Brazil, China, Colombia, India, Italy, Japan, Mexico, Nigeria, Russian Federation, Ukraine, and the United Kingdom. The Republic of Korea became the 15th member in June 2005, Canada the 16th member in July 2005, and Ecuador the 17th member in November 2005.
[17] *http://www.sdp.gov/sdp/initiative/cei/28304.htm.*

launched at the 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa, the United States established a "Clean Energy Initiative." The Initiative consists of four market-oriented, performance-based partnerships, including:

—the *Global Village Energy Partnership* (*GVEP*),[18] an international partnership with over 700 public and private sector partners with a leading role for the U.S. Agency for International Development;

—the *Partnership for Clean Indoor Air,*[19] led by the Environmental Protection Agency, addressing the increased environmental health risk faced by more than 2 billion people in the developing world who burn traditional biomass fuels indoors for cooking and heating;

—the *Partnership for Clean Fuels and Vehicles,*[20] led by the Environmental Protection Agency, which will help to reduce air pollution in developing countries by promoting the elimination of lead in gasoline and encouraging the adoption of cleaner vehicle technologies; and

—*Efficient Energy for Sustainable Development (EESD),*[21] led by the Department of Energy, which aims to improve the productivity and efficiency of energy systems, while reducing pollution and waste, saving money and improving reliability through less energy intensive products, more energy efficient processes and production modernization.

The United States is actively involved in other international technology development and deployment partnerships as well, including the Renewable Energy and Energy Efficiency Partnership, a WSSD partnership initiated by the United Kingdom. As the world's largest producer and consumer of renewable energy, and with more renewable energy generation capacity than Germany, Denmark, Sweden, France, Italy, and the United Kingdom combined, the United States is one of 17 partner countries in REEEP.

The technology-focused approach that puts climate change in the context of broader development goals is finding favor in many parts of the world. In July, at the Group of Eight Leaders meeting at Gleneagles, President Bush and his counterparts agreed to a Plan of Action on Climate Change, Clean Energy and Sustainable Development.[22] The Plan is based on over fifty specific, practical activities, mostly focused on technology development and deployment.

The United States continues to participate in the U.N. Framework Convention on Climate Change. The Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change held its 11th Session in Montréal from November 28 to December 9, 2005. In that context, we will continue to highlight the importance of collaborative partnerships developing and deploying technologies to meet the long-term challenge of climate change.

I thank you for the opportunity to testify. I look forward to responding to any questions you may have.

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[18] *http://www.sdp.gov/sdp/initiative/cei/44949.htm.*

[19] *http://www.sdp.gov/sdp/initiative/cei/29808.htm* and *http://www.pciaonline.org/.*

[20] *http://www.sdp.gov/sdp/initiative/cei/29809.htm* and *http://www.unep.org/pcfv/main/main.htm.*

[21] *http://www.sdp.gov/sdp/initiative/cei/28304.htm.*

[22] *http://usinfo.state.gov/ei/img/assets/4756/PostG8__Gleneagles__Communique.pdf.*

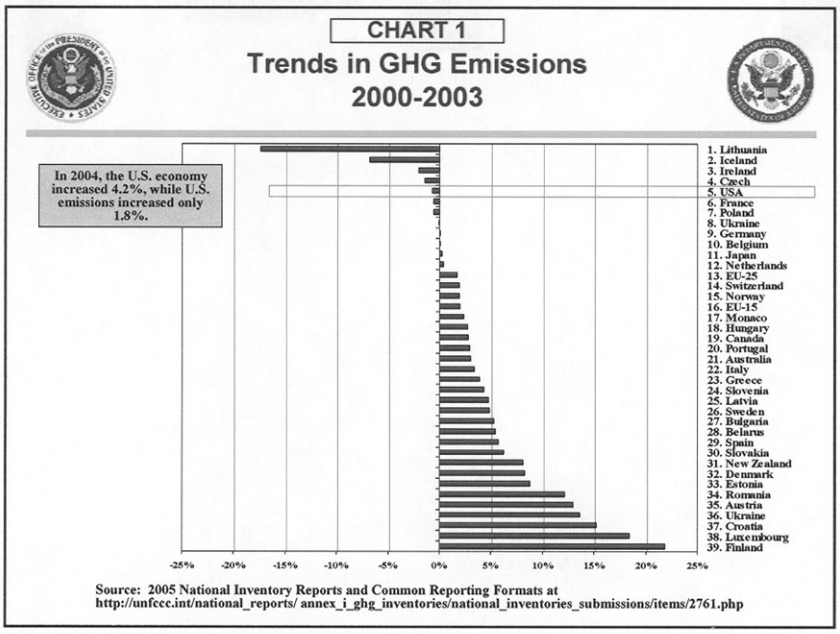


CHART 1
Trends in GHG Emissions
2000-2003
In 2004, the U.S. economy increased 4.2%, while U.S. emissions increased only 1.8%.
1. Lithuania
2. Iceland
3. Ireland
4. Czech
5. USA
6. France
7. Poland
8. Ukraine
9. Germany
10. Belgium
11. Japan
12. Netherlands
13. EU-25
14. Switzerland
15. Norway
16. EU-15
17. Monaco
18. Hungary
19. Canada
20. Portugal
21. Australia
22. Italy
23. Greece
24. Slovenia
25. Latvia
26. Sweden
27. Bulgaria
28. Belarus
29. Spain
30. Slovakia
31. New Zealand
32. Denmark
33. Estonia
34. Romania
35. Austria
36. Ukraine
37. Croatia
38. Luxembourg
39. Finland
-25% -20% -15% -10% -5% 0% 5% 10% 15% 20% 25%
Source: 2005 National Inventory Reports and Common Reporting Formats at
http://unfccc.int/national_reports/ annex_i_ghg_inventories/national_inventories_submissions/items/2761.php

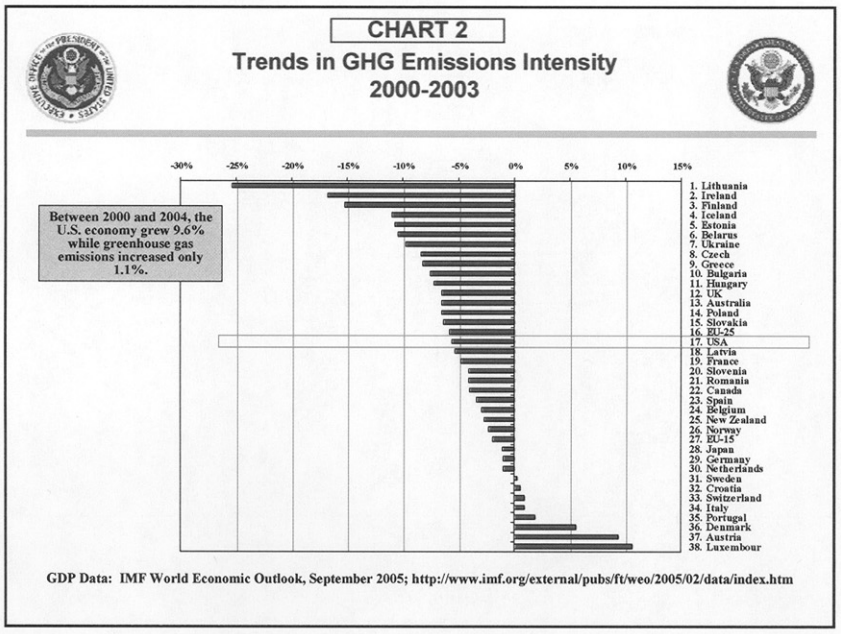


CHART 2
Trends in GHG Emissions Intensity
2000-2003
Between 2000 and 2004, the U.S. economy grew 9.6% while greenhouse gas emissions increased only 1.1%.
-30% -25% -20% -15% -10% -5% 0% 5% 10% 15%
1. Lithuania
2. Ireland
3. Finland
4. Iceland
5. Estonia
6. Belarus
7. Ukraine
8. Czech
9. Greece
10. Bulgaria
11. Hungary
12. UK
13. Australia
14. Poland
15. Slovakia
16. EU-25
17. USA
18. Latvia
19. France
20. Slovenia
21. Romania
22. Canada
23. Spain
24. Belgium
25. New Zealand
26. Norway
27. EU-15
28. Japan
29. Germany
30. Netherlands
31. Sweden
32. Croatia
33. Switzerland
34. Italy
35. Portugal
36. Denmark
37. Austria
38. Luxembour
GDP Data: IMF World Economic Outlook, September 2005; http://www.imf.org/external/pubs/ft/weo/2005/02/data/index.htm

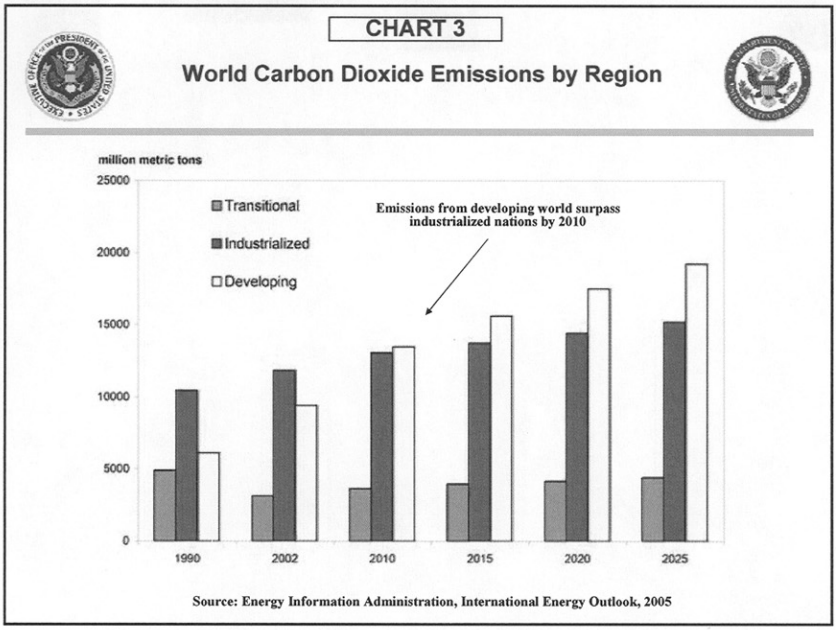
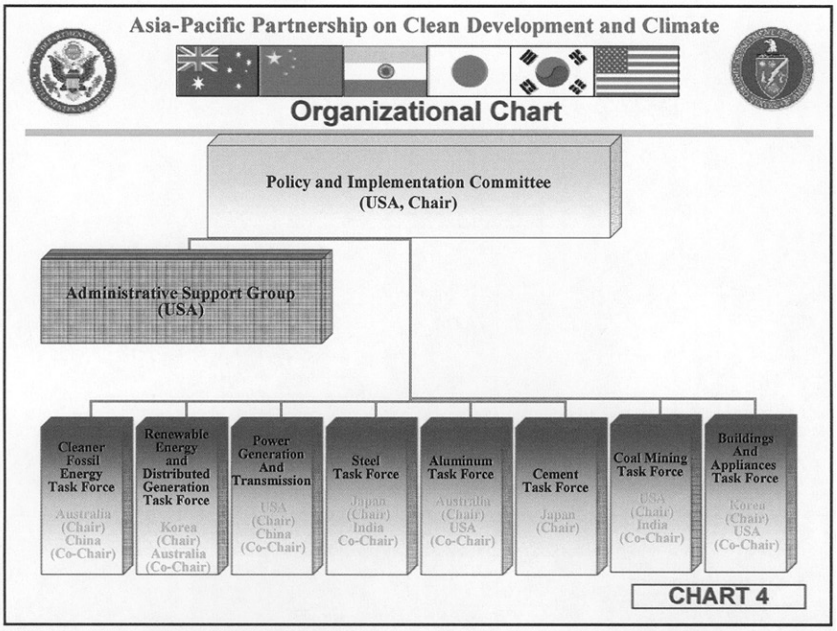


CHART 3
World Carbon Dioxide Emissions by Region
million metric tons
25000
20000
15000
10000
5000
0
Transitional
Industrialized
Developing
Emissions from developing world surpass industrialized nations by 2010
1990
2002
2010
2015
2020
2025
Source: Energy Information Administration, International Energy Outlook, 2005


Asia-Pacific Partnership on Clean Development and Climate
Organizational Chart
Policy and Implementation Committee (USA, Chair)
Administrative Support Group (USA)
Cleaner Fossil Energy Task Force
Australia (Chair) China (Co-Chair)
Renewable Energy and Distributed Generation Task Force
Korea (Chair) Australia (Co-Chair)
Power Generation And Transmission
USA (Chair) China (Co-Chair)
Steel Task Force
Japan (Chair) India Co-Chair)
Aluminum Task Force
Australia (Chair) USA (Co-Chair)
Cement Task Force
Japan (Chair)
Coal Mining Task Force
USA (Chair) India (Co-Chair)
Buildings And Appliances Task Force
Korea (Chair) USA (Co-Chair)
CHART 4

Asia-Pacific Partnership on Clean Development and Climate

Clean Fossil Energy Task Force Objectives

- Build on the range of existing national (and other international) measures and initiatives to develop an Asia-Pacific Partnership cleaner fossil energy technology development program.
- Identify the potential for, and encourage uptake of, CO_2 geo-sequestration opportunities in Partnership countries.
- Further develop coal bed and waste coal mine methane gas and LNG/natural gas opportunities and markets in the Asia-Pacific region.
- Build the research and development base, and the market and institutional foundations of Partners through technology supporting initiatives, such as education, training and skills transfer.

CHART 5.1

Asia-Pacific Partnership on Clean Development and Climate

Renewable Energy and Distributed Generation Objectives

- Facilitate the demonstration and deployment of renewable energy and distributed generation technologies in Partnership countries.
- Identify country development needs and the opportunities to deploy renewable energy and distributed generation technologies, systems and practices, and the enabling environments needed to support wide-spread deployment, including in rural, remote and peri-urban applications.
- Enumerate financial and engineering benefits of distributed energy systems that contribute to the Partnership's economic development and climate goals.
- Promote further collaboration between Partners on research, development and implementation of renewable energy technologies including supporting measures such as renewable resource identification, wind forecasting and energy storage technologies.
- Support cooperative projects to deploy renewable and distributed generation technologies to support rural and peri-urban economic development and poverty alleviation.
- Identify potential projects that would enable Partners to assess the applicability of renewable energy and distributed generation to their specific requirements.

CHART 5.2

Asia-Pacific Partnership on Clean Development and Climate

Power Generation and Transmission Task Force Objectives

- Assess opportunities for practical actions to develop and deploy power generation, transmission and demand side management technologies that can aid development and climate concerns.
- Facilitate demonstration and deployment of practices, technologies and processes to improve efficiency of power production and transmission within Partnership countries.
- Enhance collaboration between Partners on research and development of such technologies and processes.
- Enhance synergy with relevant objectives of other Task Forces (i.e. Cleaner Fossil Energy, Renewable Energy and Distributed Generation and Buildings and Appliances).
- Identify potential projects that would enable Partner countries to assess the applicability of energy feedstocks to their specific requirements.
- Identify opportunities to enhance investment in efficient power supply by improving energy markets and investment climate.

CHART 5.3

Asia-Pacific Partnership on Clean Development and Climate

Steel Task Force Objectives

- Develop sector relevant benchmark and performance indicators.
- Facilitate the deployment of best-practice steel technologies.
- Increase collaboration between relevant Partnership country government, research and industry steel-related institutions.
- Develop processes to reduce energy usage, air pollution and GHG emissions from steel production.
- Increase recycling across the Partnership.

CHART 5.4

Asia-Pacific Partnership on Clean Development and Climate

Aluminum Task Force Objectives

- Enhance current production processes of aluminum through uptake of best-practice use of existing equipment.
- Advance the development and deployment of new best practice aluminum production process and technologies across Partnership economies.
- Enhance sector-related data, including recycling and performance.
- Facilitate increased aluminum recycling rates across the Partnership.

CHART 5.5

Asia-Pacific Partnership on Clean Development and Climate

Cement Task Force Objectives

- Facilitate demonstration and deployment of energy-efficient and cleaner product formulation technologies in Partnership countries that will significantly improve the GHG emissions intensity and the air pollutant emissions intensity of cement operations.
- Develop sector relevant benchmark and performance indicators.
- Take advantage of opportunities to build infrastructure in developing countries and emerging economies that uses energy efficient cement and concrete building and paving materials.

CHART 5.6

Asia-Pacific Partnership on Clean Development and Climate

Coal Mining Task Force Objectives

- Facilitate technologies and practices that can improve the economics and efficiencies of mining and processing and continue to improve safety and reduce environmental impacts.
- Establish, as appropriate, efficiency and emissions intensity and mine reclamation objectives based on each nation's circumstances.
- Identify current reclamation activities in each country, as appropriate, and exchange best practice information in reclamation of surface mined lands with a focus on enhanced surface reclamation practices that improve the opportunities for carbon sequestration.

CHART 5.7

Asia-Pacific Partnership on Clean Development and Climate

Building and Appliances Task Force Objectives

- Use cooperative mechanisms to support the further uptake of increasingly more energy efficient appliances, recognizing that extensive cooperative action is already occurring between Partner countries.
- Promote best-practice and demonstrate technologies and building design principles to increase energy efficiency in building materials and in new and existing buildings.
- Support the integration of appropriate mechanisms to increase the uptake of energy efficient buildings and appliances into broader national efforts that support sustainable development, increase energy security and reduce environmental impacts.
- Systematically identify and respond to the range of barriers that limit the implementation of end-use energy-efficiency practices and technologies.

CHART 5.8

Senator VITTER. Thank you, Chairman Connaughton.

I understand you have a number of Federal agencies with you today to help answer questions. At this point, maybe it would be

appropriate for you to introduce those representatives, in case any of our questions are directed at them.

Mr. CONNAUGHTON. Thank you, Mr. Chairman.

I have with me Steve Eule—Steve?—who is the Director of the Climate Change Technology Program. I have Joey—and he's—I have—and he's from the Department of Energy—I have Joey Neuhoff, who's the Director of the Office of Energy and Environment, from the Department of Commerce. Joey? I want to underline "Commerce." It's very essential that our trade promotion activities advance the objectives of this partnership. I have Aaron Brickman, from the Office of Energy and Environment, from the Department of Commerce. And I have Trigg Talley, from the Department of State, the Office of Oceans, Environment, and Science.

Senator VITTER. Great.

OK, Mr. Chairman. As I said in my opening statement, one of the daunting things about this whole issue, when you look at it, is what developing countries like China and India plan over the next few decades—China, 800 coal-fired power plants, without the benefit of clean coal or gasification. Obviously, for that to change, this sort of initiative has to be meaningful, and there needs to be real buy-in and real involvement from countries like that. What is your view, so far, about how meaningful that buy-in really is, given that to make a difference it's going to have to change some major plans that they might otherwise have in the next several decades?

Mr. CONNAUGHTON. Well, let me start with the situation, which is, when I started my job, you were looking at the major emerging economies' greenhouse gas emissions exceeding ours sometime around 2020. Well, the projection now is they will exceed the developed world's emission profile by 2010. So, that's how fast things are changing there. It's also the case, for example, that the air pollution in China today—they release as much air pollution today as the U.S. did at its peak. And China's economy is only a fraction of our economy. And I want to continue to make this point. Air pollution matters, as do greenhouse gases.

So, now to the seriousness. I do think that China is hit—has hit a turning point, based on my visits there, at very high levels. And I think the best indicator of that is, for the first time in their 11th 5-year plan, they have made a specific commitment that they are formalizing right now. And I think it's this. We can confirm this. But they're committed to improving the efficiency of their fossil-fuel-fired power plants by 20 percent by 2010. And they've made a commitment to desulphurize 46 percent of their power plants. That's a big deal, for China to say something like that, that publicly.

I have spoken with the individuals responsible for the plan. They are putting in place the mechanisms for moving forward. But China is kind of like where America was in the mid-1970s. The commitment was there, but the institutions and the actions—they're in the formative stage of really pulling it off.

Now, interestingly, China is going to achieve that through straight, good, old-fashioned management. They're going to mandate a bunch of investments. But they also have some regulatory programs that will achieve this, as well. They have a program on air pollution that looks a little bit like our New Source Review Pro-

gram. The issue for them is, Does it have teeth? And our EPA is working very diligently with them to develop the same kind of aggressive monitoring and compliance regime in their country that we enjoy in this country.

So, we're at a turning point, but the proof is in the pudding. And this Partnership is going to create a situation of joint accountability, and, importantly, joint constructive action, going forward. Again, we have found a way—a positive platform to advance these initiatives, rather than trying to, you know, litigate or negotiate toward some of these outcomes.

Senator VITTER. Now, there are clearly a number of other venues for multilateral global climate change cooperation—the G8, the Framework Convention, Methane to Markets, et cetera. How does this initiative fit into all that? And give us some reassurance that we're just not cluttering, you know, the landscape with yet another initiative, when other venues already exist.

Mr. CONNAUGHTON. Let me start with the end of your question, Mr. Chairman, which is—we need dozens, and, ultimately, hundreds, of initiatives like this. And so, we can't have too many, in that sense, because as we get to the ground level, you know, we have issues in steel, and in manufacturing, and we need lots of this kind of activity.

I would characterize the Asia-Pacific Partnership as now being on the leading edge, though. By only having six countries, and with focused task-force activities, we can actually achieve more, in real terms. By contrast, the Kyoto process, there are 189 countries, with climate experts who largely don't have operational responsibility for any of the outcomes. So, that's a very huge process to try to get a conversation going in. Six is a lot easier. And each of these task forces will have about 24 people on them. Now, that's the kind—with budget and responsibility—that's the kind of conversation that we need to replicate more and more.

In the G8, the task forces—the partnership is perfectly consistent with the G8 leaders' agreement that we need to address these issues in an integrated way, and the call for more work with developed countries—so, it's accomplished that. And then, it's—you know, Methane to Markets is a good example, where we will achieve some of the Methane to Markets approach through the partnership, even as we work with some of our European counterparts and counterparts in the southern hemisphere on a bilateral basis to achieve methane reductions there.

So, it's a big set of issues to manage, and we're—we have an integrated committee in the Administration whose job it is to make sure that these pieces are moving in synchronization with each other.

Senator VITTER. OK. I'm somewhat concerned about the amount of money we spend in the Federal budget on climate change, and what we're getting for it, $5 billion, when you add up everything together. That is a major amount of money. I'm not sure exactly what we're getting for it is the best investment and how coordinated and focused, in an overall way, that effort is. Can you talk about that and how the APP fits into that overall effort?

Mr. CONNAUGHTON. We have $5 billion. About $2 billion is dedicated to climate science. That's as much as the rest of the world

commits to the issue. The U.S. is a clear leader there. And the President's budget is increasingly reflecting the priorities that were given to us by the National Academy of Sciences and then that have worked their way into our new 10-year Science Strategic Plan.

Our Nation never had a Science Strategic Plan before. We had a very intensive process, involving more than 1,000 scientists, to develop that. And now, hopefully working even more closely with the Congress, we need to get that $2 billion budget better aligned with the priorities that the scientists have identified.

On the technology side, the last 4 years were really about new transformational technologies, like hydrogen, very-low- or zero-pollution coal. These are technologies that are, you know, a few years away.

I think the conversation in the next—that—and so, this $3 billion is going toward these very big technology opportunities. And so, it's very important to sustain that funding. And that is now being done in a very—with a very transparent technology plan that some have—some love, some have criticism of. But it's an organized plan, for the first time.

The next 4 years, though, from our perspective, has to now really look at these near-term or close-to-near-term opportunities for investment. You know, it was right to spend our time on the longer-term bets to get it moving, but now we can look at things like methane, efficiency in power generation, these profitable investment streams, and start to get some real delivery in results next year, the year after that, even as we hope for things like hydrogen, cellulosic ethanol, and some of these other items that are in the recent energy bill as they come online, you know, a few years hence.

Senator VITTER. Great.

Senator Lautenberg?

Senator LAUTENBERG. Thanks, Mr. Chairman.

Mr. Connaughton, I get the sense, listening to you, that we're hard at work on trying to make sure that, in the future, other nations contribute to the problem—solving the problem of greenhouse gases and global warming, the environmental pollution. Is it not true that we, in America, 4 percent of the population of the world, create about 25 percent of the greenhouse gases?

Mr. CONNAUGHTON. I don't have the exact figure. I think you're close. Our greenhouse gases are a lower percentage than our economic output, but it should not be——

Senator LAUTENBERG. Well, you're not representing the budget here, you're representing the environmental side. So, I understand about the budget, and I understand about business. I come out of the corporate world, and all that. I want to get to what point in time you think there's a real alarm that ought to be sounded. At what point in time do we observe the disappearance of species? At what point in time do we see countries that are—areas that were constantly under snow and ice disappearing in front our eyes and say, "You know what?"—yes, this is a good idea, the partnership, but, at what point in time do we, here in America, invest in making sure that we do what we can to protect the children of the future, my grandchildren and anybody else's grandchildren sitting out there? At what point——

Mr. CONNAUGHTON. The point in time——

Senator LAUTENBERG.—in time?

Mr. CONNAUGHTON. The point in time, Senator, was 1992, with the signing and ratification of the Framework Convention on Climate Change, and today, and tomorrow, and in the coming decades. The time is now.

Senator LAUTENBERG. Yes. So, what is in place now? If we can contribute, as we do, to this large volume of greenhouse gases—I was in the Brazil once, on a Earth Summit, and I talked to an interior minister down there and asked them to please help us understand why they're burning the Amazon forests. And he said, "Well, one of our farmers will burn an acre of land to sustain his family of four for life. And one of your workers in a chemical plant can create that much pollution in a single day. If you want us to stop burning the forests, then you make a contribution. You sustain this farmer, and we'll make sure that for every farmer that you—whose life you help improve, that we'll stop burning the forest. That's not your territory. It's our territory, and we'll take care of ourselves."

But I don't see it happening in our country. And when your former Chief of Staff edits reports by climate scientists to undercut their findings about global warming, did he have the technical background? Did he have the authority to redact those findings, the ones that were put out by the scientists from NASA? Is that the kind of conduct that we salute in our country, that if you don't agree with the outcome, change the words?

Mr. CONNAUGHTON. Let me take the first question first, and then I'll answer the second one.

Senator LAUTENBERG. Talking about Phil Cooney, right?

Mr. CONNAUGHTON. Phil Cooney, that's correct.

Let me answer the first one. In my testimony, I provided an extensive discussion of the wide variety of actions that are occurring in the context of Federal programs. We have dozens of Federal programs, starting in 1992, initiated by the first President Bush, new—programs developed new by the Clinton Administration, and we have added a whole raft of programs, as well, under the Bush Administration. So, we are building this portfolio I described.

Just at Federal facilities alone, Senator, we have the new Federal Energy Management Plan. Courtesy of the Congress, the Federal Government can now write energy savings contracts. We are busily out there doing it. And what that means is, the private sector pays to install efficiency equipment at Federal Government facilities at no cost to the taxpayer. We share the energy savings with the private-sector entity that does it. We get a massive improvement in efficiency. We also offset the greenhouse gases——

Senator LAUTENBERG. Will our air improve? Has there been a reduction, as of now, in greenhouse gas? Or is—are the reductions in those that were about to occur?

Mr. CONNAUGHTON. Not only are we getting greenhouse gas reductions with each new investment in efficiency at Federal facilities, but if we stay on track with this plan—and we—this Administration is dedicated to doing that——

Senator LAUTENBERG. How much do the Federal facilities contribute to the total emission of greenhouse gas?

Mr. CONNAUGHTON. Let me just give you an example, Senator. This program is projected to reduce the greenhouse gas output of the Federal Government alone by about 42 million metric tons. Let me put that in perspective. The Kyoto process will generate about a 500-million-metric-ton reduction. This is almost a tenth of that, just from Federal—U.S. Federal Government facilities alone, at a net savings to the taxpayer and through innovative products being sold by the private sector. See, it's these kinds of policies that can produce big-ticket outcomes. And that's what we're looking at.

I could go on at length over these——

Senator LAUTENBERG. Yes, I know you could.

Mr. CONNAUGHTON.—dozen programs.

Senator LAUTENBERG. I know you could. And I——

Mr. CONNAUGHTON. But——

Senator LAUTENBERG.—appreciate it, but that's not—want to know is, At what point do we say that we've started to gain on this? At what point have we slowed the deterioration of the atmosphere?

Mr. CONNAUGHTON. The current data, through 2004—so, if you take the period from 2000 to 2004—for several reasons, good and bad, that I outline in my testimony, the United States has slowed the growth of its greenhouse gas emissions substantially. The first step is to slow them down.

Senator LAUTENBERG. Slowed the growth.

Mr. CONNAUGHTON. Just like we did on air pollution, all the way through the 1970s and 1980s.

Senator LAUTENBERG. Have we reduced the quantity that's being emitted now? If we look at last year and the year before and the 5 years before that, have we reduced the quantity of greenhouse gases that are being emitted in our country?

Mr. CONNAUGHTON. We have a significant net reduction of methane, a significant net reduction of some of the specialty gases, like——

Senator LAUTENBERG. Carbon?

Mr. CONNAUGHTON.—like PFCs, perfluorocarbons.

Senator LAUTENBERG. Carbon?

Mr. CONNAUGHTON. We still have carbon dioxide increasing, but it is increasing at a declining rate. That is exactly the pathway we want to see. Let me give you the statistics. Our economy has grown by about 9.5 percent since 2000, and yet our carbon greenhouse gases and the other net greenhouse gases have grown only 1.1 percent. That is a very important step, that we're able to have economic growth with much fewer greenhouse gases.

Senator LAUTENBERG. So, the green—the obvious thing is that, more than anything else, we want the economic growth.

Mr. CONNAUGHTON. No. We need both, Senator.

Senator LAUTENBERG. We need both. But one is outpacing, in my view, the thought process and the behavior of our interest in controlling the——

Why were those reports that—the report that was written, authored by—what was his name? He's the—no, the scientist from NASA—yes—redacted? And why was Mr. Cooney involved in changing language? Can you tell me that?

Senator VITTER. If I can ask for a quick answer on that, and then we're going to take a brief recess for some floor statements and activity on immigration, and we'll come right back, and we can pick it up wherever you leave off, Mr. Connaughton.

Mr. CONNAUGHTON. Right, thank you, Mr. Chairman.

Mr. Cooney was part of a very extensive interagency review process that included policy advisors, lawyers, scientists, and other officials across the board. The ultimate part of that policy process is reviewed by the science officials in charge of those documents. Some edits were accepted, some edits were rejected. That's true of all of us, including me. And so, we have an interactive process. The report went out publicly in 2003. When it went out, the substance of the report, we didn't hear much about it, so it seemed right. And the process of editing is a process that occurs all across the Government at all levels. Mr. Cooney was an important contributor to that process.

Senator VITTER. We're going to take a quick recess for some floor activity on immigration. The leader is making a statement that I want to be there for. Senator, do you have more questions for Mr. Connaughton, or shall we release him and go on to the second panel?

Senator LAUTENBERG. I'd like to——

Senator VITTER. It's completely up to you.

Senator LAUTENBERG.—I'd like to continue. How long a——

Senator VITTER. Shouldn't be that long. I would hope it would be less than a half an hour.

We'll take a recess for——

Senator LAUTENBERG. Are you available?

Mr. CONNAUGHTON. I believe so. Let me—half an hour. Yes, I have a little time after that.

Senator VITTER. OK. We'll take a brief recess, and I'll return absolutely as quickly as I can.

Thank you very much.

[Recess.]

Senator VITTER. At this time, we'll resume. And I want to apologize for keeping you here, apparently for no reason, now, in retrospect. So, I'm very sorry for that delay. I'll ask Senator Lautenberg, the Ranking Member, to follow up with you on any further questions.

Thank you very much for being here.

Mr. CONNAUGHTON. Thank you, Mr. Chairman. And, again, I appreciate your holding this hearing to get more information about the actions we're taking. And, in addition to questions in writing, I'd be happy to sit down, one-on-one, with any of the Members of the Subcommittee, and give them whatever time they need to make sure that they are fully educated on these consequential activities. They're going to make a real difference all around the world.

Senator VITTER. Great. Thank you very much.

And now I'd like to invite up our second panel.

[Pause.]

Senator VITTER. I want to welcome our second panel. And I'll introduce them all, at this time. Dr. Margo Thorning is Managing Director of the International Council for Capital Formation. Dr. David Montgomery is Vice President of CRA International. And we

also have Mr. David Doniger, Policy Director of the Climate Center with the Natural Resources Defense Council.

Welcome to all of you. And we'll begin with Dr. Thorning.

STATEMENT OF DR. MARGO THORNING, MANAGING DIRECTOR, INTERNATIONAL COUNCIL FOR CAPITAL FORMATION

Dr. THORNING. Thank you, Mr. Chairman. I appreciate the opportunity to submit the statement for this record.

I'm Margo Thorning, Managing Director of the International Council for Capital Formation, a Brussels-based think tank whose goal is to promote market-based solutions based on cost-benefit analysis to address economic and environmental issues. The ICCF is an affiliate of the American Council for Capital Formation.

We appreciate the opportunity to comment on the goals of the Asia-Pacific Partnership and the positive impact that voluntary programs, in contrast to mandatory programs, can have in reducing greenhouse gas emissions.

I think it's useful to take a look at how our allies in Europe are doing with their mandatory approach to reducing greenhouse gases. The EU's emission trading system covers approximately 12,000 emitters, and those are responsible for about 40 percent of total greenhouse gas emissions in the EU. The European Environmental Agency shows that the EU is not on track to meet their Kyoto target. They are expected to be 4 percent above 1990 levels of emissions, rather than 8 percent below, as required by the Kyoto Protocol.

If you're interested in individual country studies of what the economic impact would be of a mandatory system that covered all sectors of the EU, those are available at the ICCF's website, *www.iccfglobal.org*.

The U.S. is actually doing better, in terms of reducing emissions intensity, than is the EU. If you take a look at *Figure 2* in my statement, which I would appreciate being submitted for the record, you can see that since—over the 1997–2003 period, U.S. has reduced its emissions intensity by over 12 percent, compared to only 7 percent in the EU. So, with our voluntary system, we're actually making more progress in reducing emissions intensity, while continuing to grow our economy strongly, than is the EU.

Another issue to think about is, Will mandatory targets drive the investment in new energy-efficiency technology that will be the key to reducing greenhouse gas emissions? If investors are forced to make near-term end-of-pipe solutions to curb emissions in the short-run, that will divert resources that are needed to focus on long-term spending on R&D. Even—it's also very difficult for an investor to have confidence in a mandatory target. A current government really can't bind a future government as to either emission targets or as to safety-valve prices.

Third, the U.S. population is growing. It's expected to grow about 20 percent over the next 20 years. In the EU, population is not growing much at all. So, even with their stagnant population, they're not able to meet their Kyoto targets. So, that is something to be considered when looking at a mandatory system, as opposed to voluntary.

I think the focus of the current Administration's policy, which is based on incentivizing new technology, is probably the most productive way to try to address the potential threat of climate change. You might be interested in *Table 2* in my submission, which compares the EIA—DOE EIA's simulation of a high-tech—faster high-tech penetration over the 2020–2030 period with that of a mandatory cap-and-trade program. The EIA data suggests that the voluntary approach, which assumes a higher penetration of new tech, actually reduces greenhouse gas emissions more than does a mandatory approach, and it has the further benefit of increasing GDP and reducing electricity prices. So, clearly there's a lot of scope here in the U.S. for reducing greenhouse gas emissions, particularly as we incentivize new technology.

How to incentivize it? One positive thing that we might do is reduce the cost of capital for new investment. The U.S. has a tax code that has much slower capital-cost recovery than most other countries. For example, combined heat and power, a U.S. investor gets only 29 cents back after 5 years; whereas, a Brazilian investor gets 50 cents back, and a Chinese investor gets a dollar back. So, their capital costs are lower, because they have much more rapid depreciation.

So, looking at incentivizing investment here in the U.S. through those type of positive measures, as well as encouraging the type of activities that Chairman Connaughton discussed and Dave Montgomery will also discuss, I think, are the positive way to reduce greenhouse gases without harming U.S. economic growth.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Thorning follows:]

PREPARED STATEMENT OF DR. MARGO THORNING, MANAGING DIRECTOR, INTERNATIONAL COUNCIL FOR CAPITAL FORMATION

Introduction

Mr. Chairman and Members of the Subcommittee, I appreciate the opportunity to submit this statement for the record. The International Council for Capital Formation is a Brussels-based think tank whose goal is to promote market-based solutions cost-benefit analysis to address economic and environmental issues. The ICCF is an affiliate of the Washington-based American Council for Capital Formation. We appreciate the opportunity to comment on the goals of the Asia-Pacific Partnership on Clean Development and Climate and positive impact that voluntary programs (in contrast to mandatory programs) can have in reducing greenhouse gas emissions.

Pros and Cons of Mandatory Approaches to GHG Reduction

Although there are numerous supporters of mandatory U.S. programs to reduce GHGs in the U.S. it is useful to examine the record of our allies in the EU in reaching their Kyoto Protocol targets before making such a committment:

- *Emission Trading in the EU:* As U.K. Prime Minister Tony Blair noted in a speech last week, "I think first of all I should say that Britain is one of the very few countries in the world that will meet its Kyoto targets." The main reasons for the U.K. being one of the few countries able to meet its Kyoto target are: (1) that it switched from coal to natural gas power for electricity generation, and (2) DuPont closed a facility that emitted large quantities of GHGs. Other EU countries are not so fortunate and incur significant costs if they try to meet their Kyoto targets. The ETS requires approximately 12,000 large industrial emitters and utilities to reduce CO2 emissions (or purchase the right to emit CO2) in accordance with their country's Kyoto Protocol targets.

  The approach to emissions reductions embodied in the EU's sectoral approach has failed to make much of a dent in EU emission growth, but has the potential to make a significant impact on the economies of countries trying to meet their targets. As noted in a recent report by the U.K.'s EEF, an association of engi-

neers and manufacturers, part of the 34 percent increase in U.K. electricity prices in 2005 was due to the ETS. The price of the right to emit a ton of carbon reached unexpectedly high levels in 2005, reaching $36 per ton of CO_2 ($120 per ton of carbon). Similarly, German climatologist Dr. Gerd Weber states that the ETS has placed additional costs through higher electricity prices on a number of energy intensive companies located in Germany, making production in the EU uncompetitive versus production from outside the EU. Several companies have announced that they will shift production to non-Kyoto countries, taking with them thousands of jobs. Norsk Hydro Aluminum, a Fortune 500 energy and aluminum supplier, closed several production sites in northern Germany because of higher costs related to emissions trading/electricity prices, Dr. Weber notes. The latest data from the European Environmental Agency shows that the "EU 15" is expected to be 4 percent above their emissions target in 2010, instead of 8 percent below 1990 levels as required under the Kyoto Protocol (see *Figure 1*). There now appears to be a rift within Europe on climate change policy as Italy and some German industrialists express growing concerns with the impact of the ETS on electricity prices, production costs and competitiveness. The EU's slow economic growth rate (about 1 percent annually) and high unemployment (about 10 percent) will only be exacerbated by their ETS.

It seems very unlikely that EU governments will actually enforce their Kyoto targets because the cost, in terms of reduced GDP and employment, would be political suicide. If the EU actually wanted to reduce its emissions to the Kyoto Protocol target, it would have to use an economy-wide approach and cover all sectors, including transportation and households. Recent macroeconomic analyses of Germany, Spain, U.K., and Italy by the International Council for Capital Formation show that an economy-wide ETS designed to meet the Kyoto targets would reduce these countries' GDP levels and employment significantly in 2010 (see *http://www.iccfglobal.org/pdf/Country-reports-overview.pdf*).

Reducing GHGs: Alternative Approaches

- *Mandatory "Upstream" and "downstream" regulatory approaches:* Trying to reduce U.S. emissions through a cap and trade system applied at either "upstream" or "downstream" is likely to have serious consequences for the U.S. economy, including reduced GDP and increased unemployment rates. For example, various economic models show that the imposition of the Kyoto Protocol would reduce U.S. GDP levels by 1 to 4.2 percent annually by 2010 (see Figure 2 at *http://www.accf.org/pdf/oregontestimonyfinal.pdf*). Less stringent emission reduction targets such as those in the McCain, Lieberman, and Bingaman proposals also have negative consequences for the U.S. economy (See *Table 1*). While the upstream approach is perhaps easier to monitor and enforce because far fewer emitters would be in the system, it suffers from the fact that final consumers won't see much of a direct impact of the energy tax (or permit price) on their energy and fuel bills because those also include the cost of delivering the energy to consumers. On the other hand, if a business owner (say a paint manufacturer) who owns equipment that emits CO_2 has to submit an emission allowance for each ton emitted, he will be able to make a careful cost-benefit analysis of when it makes economic sense to replace his capital equipment or make other production related decisions. An obvious question is, if a "downstream" system for reducing CO_2 emissions is impractical because of the millions of small emitting sources, and an "upstream" system results in only attenuated decisionmaking on emissions, how efficient would a cap and trade system be in providing emission decisionmakers with a realistic incentive to efficiently and significantly reduce emissions?
- *Mandatory Caps on Emissions will not Drive Innovation:* First, caps on emissions are not likely to promote new technology development because caps will force industry to divert resources to near-term, "end-of-pipe" solutions rather than promote spending for long-term technology innovations that will enable us to reduce GHGs and increase energy efficiency. An ETS will send exactly the wrong signals to investors because it will create uncertainty about the return on new investment. A mandatory cap would be seen by U.S. investors as just the "first step" in a likely series of more stringent targets as policymakers strive to reduce developed country to trajectories suggested by IPCC scenarios. Investors know that a "safety-valve" price of carbon (designed to create a sense of confidence about future energy costs) can easily be changed. Such uncertainty means that the hurdle rate, which new investments must meet, will be higher (thus less investment will occur) and they will be less willing to invest in the U.S. In addition, investors realize that if a mandatory emission reduction pro-

gram were established in the U.S., they would be disadvantaged vis-à-vis European companies because the relationship between regulators and business in the EU tends to be more flexible and accommodating than in the U.S. Now is the time to provide incentives for companies to voluntarily undertake additional carbon dioxide intensity reducing investments, not promote a system that raises the risk of any investment in our economy.

Second, caps on U.S. emission growth are unlikely to succeed unless all the relevant markets exist (in both developed and developing countries) and operate effectively. All the important actions by the private sector have to be motivated by price expectations far in the future. Creating that motivation requires that emission trading establish not only current but future prices, and create a confident expectation that those prices will be high enough to justify the current R&D and investment expenditures required to make a difference. This requires that clear, enforceable property rights in emissions be defined far into the future so that emission rates for 2030, for example, can be traded today in confidence that they will be valid and enforceable on that future date. The international framework for climate policy that has been created under the UNFCCC and the Kyoto Protocol cannot create that confidence for investors because sovereign nations have different needs and values. Therefore, it seems likely that the ETS system which the EU has implemented will fail to spread to other parts of the world and will eventually be replaced with a more practical approach to climate change policy.

Third, a fixed cap on emissions inevitably collides with U.S. population growth. The EU–15 countries are having difficulty meeting their Kyoto targets and they have negligible population growth. In sharp contrast, U.S. population is projected to grow more than 20 percent over 2002–2025 according to the EIA. More people means more mouths to feed, more houses to warm, more factories to run—all of which require more energy and at least some additional GHG emissions.

Voluntary Approaches to Emission Reduction

- *The Role of Economic Growth and Technology in GHG Reduction:* Many proponents of the cap and trade system fail to realize that economic growth can have a positive impact on GHG emission reductions. For example, the U.S., with its voluntary approach to emission reductions, has cut its energy intensity by 12.2 percent over the 1997–2003 period compared to only 7.6 percent in the EU with its mandatory approach(see *Figure 2*). Technology development and deployment offers the most efficient and effective way to reduce GHG emissions and a strong economy tends to pull through capital investment faster. Given the extremely long lives of much of the capital stock, the voluntary approach will allow emissions intensity to be reduced in a cost effective way (see *Figure 3*). There are only two ways to reduce CO_2 emissions from fossil fuel use—use less fossil fuel or develop technologies to use energy more efficiently, to capture emissions or to substitute for fossil energy. There is an abundance of economic literature demonstrating the relationship between energy use and economic growth, as well as the negative impacts of curtailing energy use. Long-term, new technologies offer the most promise for affecting GHG emission rates and atmospheric concentration levels. In fact, a new analysis by DOE/EIA (AEO 2006) shows that their High Tech scenario reduces emissions more than does a mandatory reduction in GHG intensity (see *Table 2*) and has a positive impact on GDP levels and reduces electricity prices.
- *Tax Reform Could Reduce Growth of U.S. GHG Emissions:* Stimulating the development of various high technology programs can be accelerated through government programs as well as by encouraging private sector investment. Improving the tax treatment of new investment through faster depreciation, investment tax credits, making permanent the 15 percent tax rate on dividends and capital gains received by individuals are positive steps that reduce the cost of capital for investment. ACCF research shows that U.S. companies receive only 29 cents after 5 years through depreciation allowances on each dollar of investment in a combined heat and power facility while a company in China gets $1.04 back and a Brazilian company gets 50 cents. Thus, slow capital cost recovery in the U.S. Federal tax code places domestic companies at a disadvantage compared to our trading partners and slows the development and installation of new energy efficient technology.

Conclusion

Energy use and economic growth go hand-in-hand, so helping the developing world improve access to cleaner, more abundant energy should be our focus. Near-term GHG emission reductions in the developed countries should not take priority over maintaining the strong economic growth necessary to keeping the U.S. one of the key engines for global economic growth. Establishing a mandatory cap and trade system in the U.S. would impede, not promote, U.S. progress in reducing emissions intensity. U.S. climate change policies should continue to strive to reduce energy intensity as the capital stock is replaced over the business cycle and to develop new, cost-effective technologies for alternative energy production and conservation and encourage the spread of economic freedom in the developing world. This approach is likely to be much more productive than having the U.S. adopt an ETS and thereby sacrifice economic well-being and job growth with little or no long-term impact on global GHG emissions.

Several provisions of the 2005 Energy Bill should have a positive impact on climate change. The new Asia-Pacific Partnership for Clean Development and Climate can also play a key role in transferring new technology to developing countries and help provide the practical assistance that is needed for a global approach to emission reduction.

Table 1. Economic Impact of McCain/Lieberman and the Bingaman Proposal on the United States

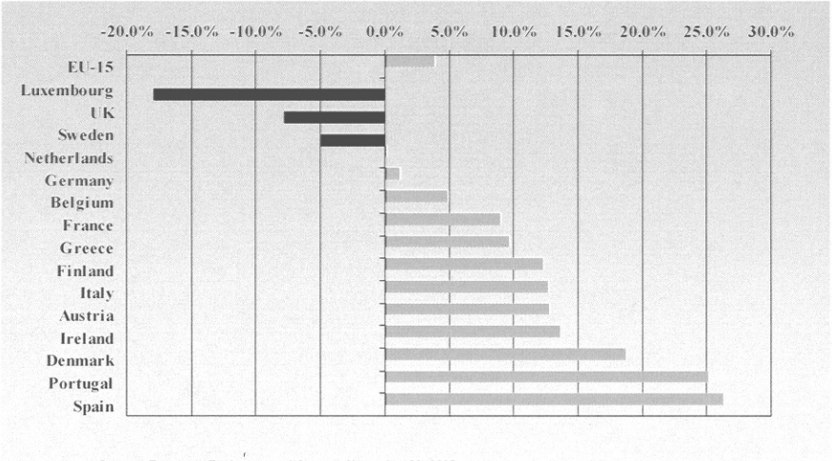
	2010		2020	
	McCain/Lieberman	Bingaman	McCain/Lieberman	Bingaman
GDP Falls	−1.0	−0.2	−1.9	−0.4
Job Losses	−840,000	−230,000	−1,306,000	−326,000
Household Consumption Falls	−$725	−$147	−$800	−$164

*State and Federal Tax Receipts Decline.
*Low Income and Elderly Bear Large Burden Due to Higher Energy Costs.

Table 2: Comparison of EIA High Tech Scenario with "Salazar Request" Cap and Trade Scenarios

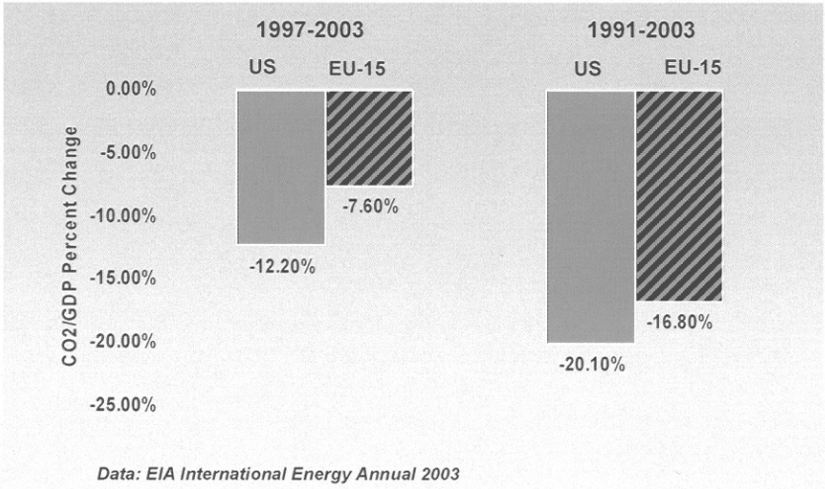
	2010	2020	2030
CO_2 Emissions From Energy (Million Mt CO_2)			
AEO2006 Reference Case	6,364	7,119	8,114
AEO2006 Integrated High Technology	6,253	6,734	7,421
EIA/Salazar Cap-Trade 2	NA	6,843	7,333
Change From Reference Case			
AEO2006 Integrated High Technology	(111)	(385)	(693)
EIA/Salazar Cap-Trade 2		(276)	(781)
Real GDP (Billion 2000 Dollars)			
AEO2006 Reference Case	13,043	17,541	23,112
AEO2006 Integrated High Technology	13,056	17,580	23,152
EIA/Salazar Cap-Trade 2	NA	17,522	23,077
Change From Reference Case			
AEO2006 Integrated High Technology	13	39	40
EIA/Salazar Cap-Trade 2		(19)	(35)
% Change from Reference Case			
AEO2006 Integrated High Technology	0.1	0.2	0.2
EIA/Salazar Cap-Trade 2		−0.1	−0.2
Electricity Prices (Average all users—cents per kwh)			
AEO2006 Reference Case	7.3	7.25	7.51
AEO2006 Integrated High Technology	7.2	7.03	7.33
EIA/Salazar Cap-Trade 2	NA	7.89	8.48
Change From Reference Case			
AEO2006 Integrated High Technology	(0.1)	(0.2)	(0.2)
EIA/Salazar Cap-Trade 2		0.6	1.0
% Change from Reference Case			
AEO2006 Integrated High Technology	−1.4	−3.0	−2.4
EIA/Salazar Cap-Trade 2		8.8	12.9

Figure 1: Greenhouse Gas Emissions in the European Union Projected to Exceed Kyoto Targets in 2010

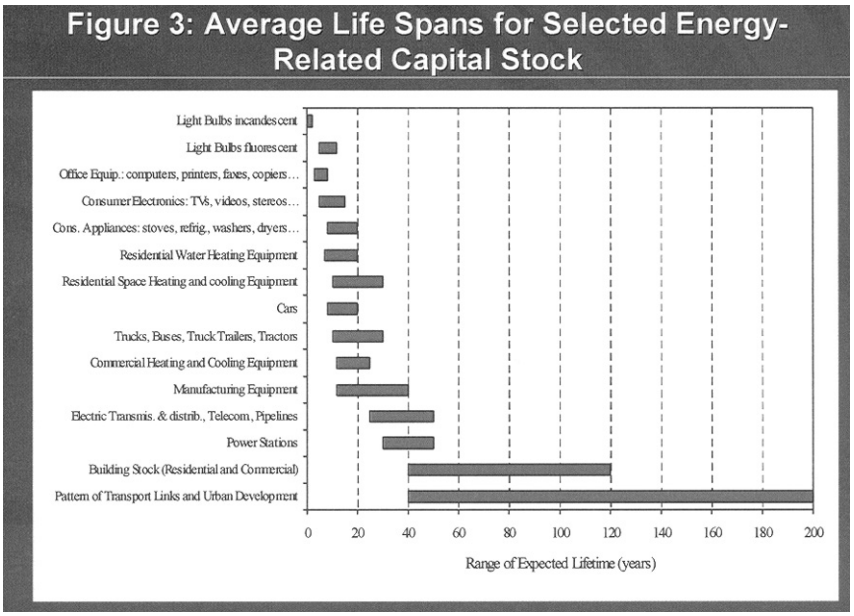


Source: European Environmental Agency, November 29, 2005

Figure 2: Comparison of EU and US Energy Intensity Reduction 1991-2003



Data: EIA International Energy Annual 2003



Senator VITTER. Thank you very much, Dr. Thorning.

Dr. Montgomery?

STATEMENT OF W. DAVID MONTGOMERY, PH.D., VICE PRESIDENT, CRA INTERNATIONAL

Dr. MONTGOMERY. Thank you, Mr. Chairman.

My name is David Montgomery, and I'm Vice President of CRA International, formerly known as Charles River Associates. I'll give a brief summary.

The Asia-Pacific Partnership addresses one of the most difficult problems with climate policy, which is how to reduce the growth of greenhouse gas emissions from developing countries while sustaining or improving their prospects for economic growth. I believe those are the only terms on which developing countries are willing to enter into discussions of climate change.

Extension of emissions caps and international permit trading to developing countries cannot solve this problem, but the Asia-Pacific Partnership can. There are large opportunities for cost-effective emission reductions in China and India. These opportunities exist because of a significant technology gap between China and India, on the one hand, and the United States and other members of the partnership, on the other.

China now produces about four times as much greenhouse gas emissions per dollar of output as the United States; and India, about twice as much. China's carbon intensity has been improving over time. But, even taking this into account, I conclude that the carbon intensity of new investment in China is about twice what it is in the United States. India has not shown much improvement for a long time; and so, its carbon intensity of new investment is also about twice that of the U.S.

This is the technology gap. If China and India could be moved to the level of technology normally in use in the United States in the new capital equipment that they're building, that change could reduce global emissions over the next decade by an amount comparable to what the Kyoto Protocol could have accomplished even if it all its signatories, including the United States, had adhered to the caps that were proposed there.

And I have placed both some of this analysis and references to the research behind it in my prepared statement, which I'd like to have submitted for the record.

This technology gap is largely explained by institutional factors in China and India that lead to wasteful use of energy and discourage foreign direct investment that would transfer technologies used globally to China and India. This can be seen readily in *Figure 2* of my prepared testimony, which shows that energy intensity is closely related to scores on an Index of Economic Freedom, which introduces measures of progress in different—in institutional reform in different countries throughout the world.

Countries that have created the institutional framework required for markets to function efficiently have relatively low energy intensity, relatively low carbon emissions per dollar of output. That includes the United States and also the Asian Tigers, which can be examples to China and India of how institutional reform produces both economic growth and lower emissions. Countries that have not developed these institutions, including China and India, have much higher energy intensity.

Now, what I do I mean by and "institutional framework," since this is what I believe the Asia-Pacific Partnership needs to address as a major focus? India surveys of the business climate identified deficiencies in excessive bureaucracy and corruption, deficiencies in the administration of justice, large subsidies that encourage wasteful energy use, and the collapse of the electricity infrastructure. In China, the list is similar, starting with lack of protection for intellectual property, an underdeveloped system of property and contract law—again, bureaucracy and corruption, and a dominant role for state-owned enterprises.

The partnership starts with a tremendous advantage when it addresses institutional reforms of this kind that would facilitate technology transfer and reduce greenhouse gas emissions, because addressing these institutional factors is critical to economic growth in China and India, as well. Both countries have begun on the process of institutional reform, and the institutional reforms that have taken place thus far are responsible for the growth that they have seen, but they are going to need a great deal more reform in order to sustain their economic growth.

It's not necessary for the Asia-Pacific Partnership to take on every aspect of this immense challenge of creating preconditions for growth in China and India. It can focus on those reforms that would have the most leverage on energy markets and technology transfer. I think this focus on institutional reform is built into the charter of the Partnership. It's critical that it become the partnership's highest priority.

Without institutional reform, no demonstration project or effort to transfer technology is going to have a chance of leading to broad

technology transfer and diffusion, because the hostile economic environment in China and India that now prevents even technologies that are in common use in the United States from being adopted. With institutional reform, market forces can be expected to lead to rapidly improving emissions intensity without imposition of emission caps or other costly programs on China and India. This is the challenge and the opportunity for the Asia-Pacific Partnership.

Thank you, Mr. Chairman.

[The prepared statement of Dr. Montgomery follows:]

PREPARED STATEMENT OF W. DAVID MONTGOMERY, PH.D., VICE PRESIDENT, CRA INTERNATIONAL

Mr. Chairman and Members of the Subcommittee:

Thank you for your invitation to testify in today's hearing. I am David Montgomery, and I am Vice President of CRA International, where I am co-leader of its global Energy and Environment Practice. This testimony is a statement of my own research and opinions, and does not represent a position of CRA International.

I am particularly pleased by this opportunity to testify on "The Role of Science in the Asia-Pacific Partnership." I believe, based on studies that I and others have conducted over the past few years, that the Asia-Pacific Partnership offers an opportunity to define an approach to climate change policy that can reconcile the objectives of economic growth and environmental improvement for developing countries.

This testimony is organized in three parts. The first section discusses the opportunities that exist for cost-effective emission reductions in developing countries, and the role of technology transfer and foreign direct investment in taking up these opportunities. The second part of my testimony provides the reasons why these opportunities exist and discusses why it is critically important that policy be designed, as the Asia-Pacific Partnership is, to attack the root causes of both poverty and high CO_2 emissions in developing countries. Those root causes are to be found in economic institutions that prevent sustained economic growth and cause wasteful energy use. Fundamental reform of economic institutions is required before any attempts to reduce the greenhouse gas intensity of developing economies can succeed, and that reform can be expected on its own to stimulate greater foreign investment and technology transfer. The final section of my testimony discusses how the Asia-Pacific Partnership can realize these key opportunities and suggestions on possible ways in which the Partnership could be made more effective.

My overall conclusion is that the Asia-Pacific Partnership presents an opportunity to define a significant new international approach to climate policy, one that does not require emission caps or trading to achieve reductions in global emissions. Although other countries are not willing to admit the failure of the Kyoto Protocol publicly, there are very promising signs of interest in the ideas embodied in the Asia-Pacific Partnership: the use of technology, the role of developing countries, and discussions among "large emitters." I therefore believe that this is a time when the United States can be engaged in international cooperation that moves away from the cap and trade approach embodied in the Kyoto Protocol toward a more technology and growth oriented approach to the climate problem. The Asia-Pacific Partnership provides the foundation for that approach.

I. Opportunity

I will make three points in regard to the opportunities that exist in developing countries.

1. Globally, the best opportunities for near-term, cost-effective reductions in greenhouse gas emissions are in China, India, and other developing countries.
2. Developing countries are only interested in approaches to reducing their greenhouse gas emissions that will enhance opportunities for economic growth.
3. Policies that stimulate greater technology transfer and investment in developing countries have the potential to achieve both economic growth and climate policy goals.

Greenhouse gas emissions are driven by population, income and technology. This fundamental relationship is described in an equation known as the "Kaya Identity."[1] It states that

$$Population * \frac{Income(\$)}{Population} * \frac{CO_2}{Income(\$)} = CO_2$$

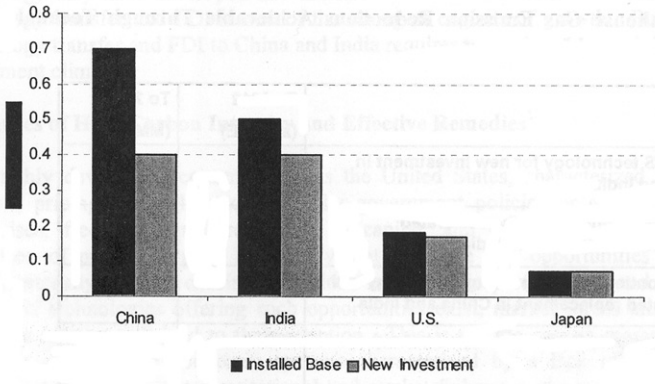
The first two terms of this equation show that growth in total income comes from population growth and growth in per capita income. Technology appears in this equation in the third term, which describes CO_2 per dollar of income. The legitimate aspiration of poor countries is to keep per capita income increasing. Population is a separate and divisive issue—and in any event is not likely to be responsive to policies in the short-run. Since per capita income growth and population growth are off the table, this leaves technology—CO_2/($)—as the feasible object for change.

Technology is critically important because emissions per dollar of income are far larger in developing countries than in the United States or other industrial countries. This is both a challenge and an opportunity. It is a challenge because it is the high emissions intensity—and relatively slow or non-existent improvement in emissions intensity—that is behind the high rate of growth in developing country emissions.

Opportunities exist because the technology of energy use in developing countries embodies far higher emissions per dollar of output than does technology used in the United States; this is true of new investment in countries like China and India as well as their installed base (See *Figure 1*). The technology embodied in the installed base of capital equipment in China produces emissions at about 4 times the rate of technology in use in the United States. China's emissions intensity is improving rapidly, but even so its new investment embodies technology with twice the emissions intensity of new investment in the United States. India is making almost no improvement in its emissions intensity, with the installed base and new investment having very similar emissions intensity. India's new investment also embodies technology with twice the emissions intensity of new investment in the United States.

The United States is a good benchmark of technology that is economic at today's energy prices, without any additional incentives or regulations that would lead to adoption of more costly technologies for the purpose of reducing greenhouse gas emissions. Japan's emissions intensity is about half that of the United States, so that Japanese technology provides a benchmark for more aggressive efforts to reduce energy use.

Figure 1: Greenhouse Gas Emissions Associated with Existing and New Investment (Million tons C per $Billion GDP)



[1] Y. Kaya, "Impact of Carbon Dioxide Emission Control on GNP Growth: Interpretation of Proposed Scenarios." Paper presented to the IPCC Energy and Industry Subgroup, Response Strategies Working Group, Paris, 1990.

Priorities for Economic Growth

Developing countries have made it clear that their highest priorities are dealing with poverty, disease, famine, unemployment and violent conflict,[2] and that sustained economic growth is a prerequisite for dealing with these problems. Therefore, developing countries have also made it clear that they will not accept caps on their greenhouse emissions and have no interest in becoming part of a global emission trading system—at least on terms acceptable to the industrial countries. They see these approaches to climate change policy as threatening their ability to grow and deal with their more pressing problems. Therefore, only approaches to climate policy that combine greater economic growth with reductions in emissions intensity have any chance of attracting the interest of developing countries.

The Importance of Technology Transfer

Technologies that offer lower CO_2 intensity have largely been developed in the industrial countries. Therefore technology transfer, which occurs largely through foreign direct investment, is required to replace carbon-intensive technology.

Technology transfer and increased investment have the potential for achieving large reductions in emissions. The potential from bringing the emissions intensity of developing countries up to that currently associated with new investment in the United States is comparable to what could be achieved by the Kyoto Protocol (See Table 1). These are near term opportunities, from changing the nature of current investment and accelerating replacement of the existing capital stock. Moreover, if achieved through transfer of economic technologies it is very likely that these emission reductions will be accompanied by economic benefits for the countries involved.

Table 1: Greenhouse Gas Emission Reductions Achievable Through Technology Transfer and Increased Investment

	To 2012 (MMTCE)	To 2017 (MMTCE)
Adopt U.S. technology for new investment in China and India	2,600	5,200
Adopt U.S. technology with accelerated replacement in China and India	4,200	7,700
Adopt continuously improving technology with accelerated replacement in China and India	5,000	9,800
EU under Kyoto Protocol (without hot air)	*600*	*1,400*
All Annex B countries under Kyoto Protocol (including U.S. and hot air)	*2,800*	*7,300*

The potential emission reductions estimated in *Table 1* are derived from a study my colleagues and I performed using a model of economic growth based on the idea of "embodied technical progress." In the first case, we assumed that in 2005 new investment in China and India immediately moves to the level of technology observed in the United States, and calculate the resulting reduction in cumulative carbon emissions through 2012 and 2017. This is the technology transfer case. In the second case, we assume that policies to stimulate foreign direct investment accelerate the replacement of the oldest capital with new equipment, giving even larger savings. In the third case, we assume that the new technology continues to improve over time, as it will if policies to stimulate R&D into less emissions-intensive technologies are also put in place. It can be seen that even the least aggressive of these policies has potential for emissions reductions as large as possible if all countries (including the U.S.) achieved exactly the emission reductions required to meet their Kyoto Protocol targets. This is because the technology gap is so large, and because of the large share of global emissions that will come from China and India in the next few decades.

It is also important to note that given the large difference between emission intensities of China and India and the U.S., and the relatively small remaining distance between the U.S. and Japan, most of the emission reductions achievable through technology transfer can be achieved be moving from current to U.S. technology. Going beyond this in the next decade or so, by pushing developing countries to adopt

[2] The World Summit on Sustainable Development (WSSD) reaffirms the need to have balanced economic development, social development and environmental protection. It also reaffirms poverty eradication and preservation of the environment as the overarching objectives of sustainable development (United Nations 2002).

technology not currently economic even in the United States, entails rapidly increasing costs and smaller emission reductions.[3]

The difference in technology that accounts for the difference in emissions intensity between developing countries and the U.S. will not be eliminated without substantially greater technology transfer. That technology transfer occurs largely through the mechanism of foreign direct investment, as multinational companies bring with them the technology they have developed and use in their current markets. The combination of technology transfer and FDI is one of the strongest engines of growth. But increasing technology transfer and FDI to China and India requires removing current defects in their investment climate.

II. Causes of High Carbon Intensity and Effective Remedies[4]

In a highly developed economy such as that of the United States, characterized by efficient markets, pricing relatively undistorted by government policies or government-owned enterprises, free trade and free flows of capital, and strong legal institutions and protection of property rights, it is likely that there are few opportunities to improve carbon intensity without causing reductions in economic performance and income per capita. If technologies offering such opportunities exist, market forces and individual economic interest will lead to their adoption. This is not the case in many developing countries, which have economic systems characterized by a lack of incentives for efficient energy use, due to institutional and market failures, and an investment climate that discourages foreign investment and technology transfer. Remedying these institutional and market failures offers the prospect of reconciling economic growth and emissions reduction.

Economic Freedom and Emissions Intensity

The modern literature on economic development emphasizes the role of legal, market and governmental institutions in economic development. The concept of "economic freedom" summarizes a wide variety of conditions that are found to be conducive to individual initiative and economic growth.[5] Indices of economic freedom are based on comprehensive surveys of conditions around the world. The broad indices of economic freedom include specific institutional problems that can lead to high carbon intensity:

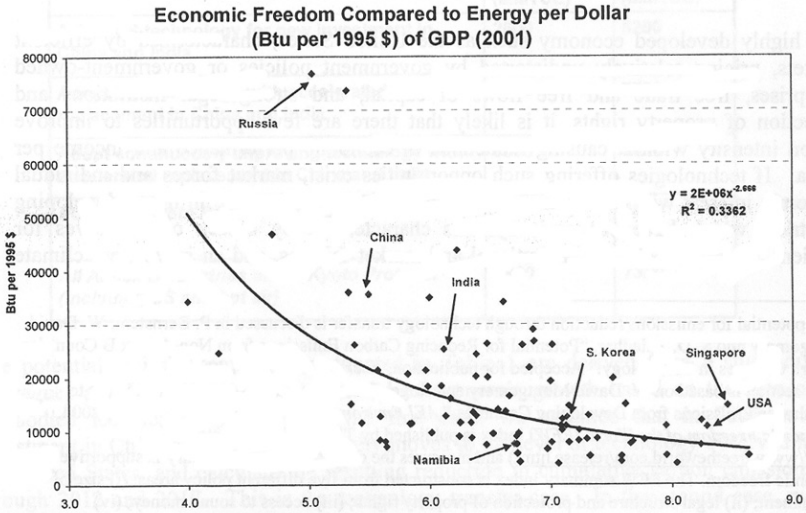
- Pricing systems that make efficient technologies unprofitable.
- Institutions and policies that make markets inhospitable to foreign investment with world class technology.
  —Rule of law and protection of intellectual property.
  —Role of state owned enterprises.
  —Access to foreign capital.
- Lack of infrastructure, education and skills required for technology.

[3] The potential for emissions reduction through technology transfer is discussed in P. Bernstein, W. David Montgomery and S.D. Tuladhar, "Potential for Reducing Carbon Emissions from Non-Annex B Countries through Changes in Technology." Accepted for publication, *Energy Economics.* 2006.

[4] This section is based on W. David Montgomery and Roger Bate. "Beyond Kyoto: Real Solutions to Greenhouse Emissions from Developing Countries." *AEI Environmental Policy Outlook,* July 1, 2004.

[5] *Economic Freedom of the World (EFW)* index is published by The Frasier Institute (*http://www.freetheworld.com/release.html*) and measures the degree to which a country is supportive of economic freedom. The EFW summary index is constructed from five different policy areas: (i) size of government; (ii) legal structure and protection of property rights; (iii) access to sound money; (iv) international exchange; and (v) regulation. *Index of Economic Freedom* is published by the Heritage Foundation/*Wall Street Journal* (*http://www.heritage.org/research/features/index/*) and reports 10 broad measures of economic freedom for 161 countries.

Figure 2: Association Between Economic Freedom and Energy Intensity



Sources: Frasier Institute, Economic Freedom of the World, 2003,
U.S. Energy Information Administration, International Energy Annual, 2002

Lack of these components of economic freedom is clearly associated with high levels of energy use per dollar of GDP. *Figure 2* plots scores on the Economic Freedom of the World Index compiled by the Frasier Institute against energy use per dollar of GDP, measured at market exchange rates.

Energy intensity is used as a measure because it is directly connected to greenhouse gas emissions from energy use. For example, three of the countries with the relatively poor scores on economic freedom, Russia, China and India, have high energy use and carbon emissions per dollar of GDP. At the other end of the scale, countries like South Korea, Singapore and Namibia with relatively free economies have much lower carbon intensities, similar to that of the United States.

The curved line represents the results of a statistical analysis of the association, which shows that about one-third of the variation in energy intensity is explained by differences in scores on economic freedom. This is an unusually clear relationship for this type of cross-sectional data. The literature on economic development also shows that the economic freedom index is very closely associated with per capita income and rates of economic growth.

In more recent, unpublished work my colleagues and I have focused on specific aspects of the institutional setting that can be expected to have a direct effect on either the efficiency of energy use or the transfer of economic technologies. This research reveals that both China and India have significant institutional shortcomings in such areas as the rule of law and administration of justice, protection of intellectual property, excessive bureaucracy and corruption, a dominant role of state enterprises in the economy, and inadequate infrastructure. In both countries, continued economic reform is recognized as being necessary to sustain current rates of economic growth. We have also found that the same institutional problems are directly connected to wasteful energy use, by diminishing or eliminating incentives for efficient use of resources, and discourage foreign direct investment of the type that leads to effective technology transfer.

Design of Policies that Can Be Effective and Engage Developing Countries

The evidence that high emissions intensity is closely associated with fundamental market and institutional failures leads me to conclude that the highest priority of the Asia-Pacific Partnership should be to facilitate the process of removing market and institutional failures in China and India.

Without remedies for the fundamental institutional problems that underlie poor scores for economic freedom, the continuation of two unfortunate current conditions can be expected:

- A hostile economic environment in China and India will prevent technology that is introduced through projects that the Partnership might support from spreading throughout the economy.
- Emission caps will remain costly, because without new technology, emission reductions will require diverting resources that could otherwise be used for growth.

If remedies are found for fundamental institutional problems, two kinds of results can be expected:

- Projects that transfer economic technologies will take place without further incentives and will lead to spillover effects and significant emission reductions.
- The root causes of both poverty and high carbon intensity will be addressed together.

The actions required to create fundamental institutional reform must take place within the developing countries themselves, and be designed and carried out by their governments, businesses and citizens. The Asia-Pacific Partnership includes China and India, the two developing countries with the largest current and potential future emissions; Korea, an Asian country whose success proves that economic freedom leads to growth and lower greenhouse gas emissions; and three countries that can be the source of direct investment and technology transfer—Australia, Japan and the United States. The great opportunity afforded by the Asia-Pacific Partnership is to create a process in which all these countries can work together to identify the needs for institutional reform in China and India, understand the benefits that institutional reform would provide in enhancing economic growth and reducing greenhouse gas emissions, and take on appropriate responsibilities for bringing about those changes. But to do this, the Asia-Pacific Partnership must make institutional reform, not identification of specific projects to be funded by donor governments, its highest priority.

III. How the Asia-Pacific Partnership Can Support Institutional Reform

The Partnership starts with a tremendous advantage when it addresses institutional reforms that will facilitate technology transfer and reduced greenhouse gas emissions, because addressing institutional issues is critical to the highest priority of both China and India. Moreover, both countries have already begun the process of institutional reform, and recognize that their current rates of economic growth were made possible by those reforms.

In the first part of this testimony I have attempted to establish that institutional reform should be the highest priority of the Asia-Pacific Partnership. This conclusion is supported first by evidence of a large gap in energy technology between China and India, on one hand, and the rest of the Partnership. This evidence comes from data on national and, to a limited extent, sectoral energy intensities which support inferences about the level of technology embodied in new investment. I also drew on research on institutional obstacles to economic growth to discuss areas in which China and India lack a market-oriented investment climate and other institutions that support efficient markets, and described how these deficiencies are likely to be causes of the technology gap.

This analysis provides strong indications that China and India lag far behind the U.S., Japan and Australia in technology, even in new investment, and that this lag and resulting high levels of greenhouse gas emissions are attributable to failings in legal, political and market institutions. There is also strong evidence that remedies for these failings would contribute to economic growth. However, much more detailed understanding of the opportunities for institutional reform and improved technology is required as a basis for an action plan, and a consensus on such an understanding is required to reach agreement on actual steps to be taken by members of the Partnership.

I believe that this consensus and agreement could be reached if the Partnership undertook four steps, that I arrange into two distinct phases.

The first phase would be a research and consensus building process, to provide a shared understanding of technological possibilities and institutional barriers. The first step in the research and consensus phase should be to identify and characterize the investment climate of China and India and the potential for emission reductions through transfer of technologies that would be economic but for institutional failures. This process would take place in working groups with participation limited to disinterested experts, representatives of the business communities and the APP governments. Achieving consensus across stakeholders and countries on the basic facts about the current investment climate and the role of FDI in promoting technology transfer will go a long way toward developing support for reforms.

It is critical that businesses who have had direct experience in applying state-of-the-art technology and dealing with the institutional setting in China and India tell their stories as part of this process. The key to success is not an outstanding set of studies by the experts, but identification of real-world opportunities and barriers. Private sector knowledge of technologies that can make it on their own in the global marketplace and experience with institutional obstacles to doing profitable business in China and India is the essential foundation of this approach.

The second step would be for the same working groups to develop proposals, given the benchmarking exercise of the first step, that would accomplish significant changes. These proposals should describe specific institutional reforms that would have direct benefits for technology transfer and efficient use of energy. Proposals should include actions by all parties, so that they are broadly perceived as equitable and cooperative. In this step in particular, opinions of international businesses on how much change is needed to create a receptive investment climate should be taken as a major input.

The third step would move from working groups to interaction among the APP governments to understand the difficulties associated with removal of obstacles for technology transfer in particular and institutional reform in general, and what each government could contribute. The current institutional climate in China and India exists for a reason, and how incremental reform can proceed in the face of interests that benefit from the *status quo* must be addressed directly. The interaction should identify actions that China and India would be willing to see Australia, Japan and the United States undertake to encourage, speed and reward the process of institutional reform, as well as feasible actions to be undertaken in China and India by their respective governments.

The final phase should be to create an ongoing process in which Partnership governments would agree to concrete actions that each would take to support institutional reforms and achieve the identified benefits for climate and economic growth. This should be designed as a pledge and review process, in which each government agrees to undertake actions desired by the others and periodically to review whether commitments were carried out. Such agreements tend to be self-enforcing, because any country that fails to abide by a commitment faces the credible consequence of losing future benefits.

Finally, I would suggest that the hardest thing in thinking about policies addressing global poverty, oppression and environmental progress is to avoid making the best the enemy of the good. Technology is a critical issue because there is no economic possibility of stabilizing greenhouse gas concentrations without R&D to create technology not available today.[6] In the long term, this technology is required to turn around developing country emissions, just as it is required to turn around emissions from the industrial world. In the long-run, new technology for developing countries is clearly critical. R&D to create this technology is therefore also critical, and the technology that is economically successful may be different in the global South than in the global North.

But right now the huge opportunity is in replacing technology now being used in the global South with technology now being used in the global North. Therefore, it is extremely important to keep the focus of the Asia-Pacific Partnership on bringing about the critical market reforms that will lead to greater technology transfer and improvements in carbon intensity. Identification of deficiencies in institutions and economic freedom in each country should be a key first step, after which the members of the Partnership can address mutually supportive actions to remove those barriers and improve the flow of investment and technology into China and India.

Senator VITTER. Thank you, Dr. Montgomery.

And now, Mr. Doniger.

STATEMENT OF DAVID D. DONIGER, POLICY DIRECTOR, CLIMATE CENTER, NATURAL RESOURCES DEFENSE COUNCIL

Mr. DONIGER. Thank you, Senators, for the opportunity to testify today on this topic.

I'm David Doniger. I'm Climate Policy Director at the Natural Resources Defense Council. I also served at the Environmental Protection Agency in the 1990s, where I helped direct Clinton Admin-

[6] M.I. Hoffert *et al.,* "Advanced Technology Paths to Global Climate Stability: Energy for a Greenhouse Planet" *Science,* Vol. 298, Nov. 1, 2002, p. 981–7.

istration climate policies. I might add that I have no support from the Exxon Corporation.

The Asia-Pacific Partnership is symptomatic of the current Administration's failure to take meaningful action to curb global warming. The U.S. has limited the terms of engagement with other countries to strictly voluntary measures, backed by what can only be described as token funding. On these terms, the partnership cannot make a difference; it's simply an exercise in looking busy.

Now, time is running out. Most serious climate scientists now warn there's a very short window of time to begin serious emission reductions to avoid truly dangerous global warming. The science debate is over. The National Academy of Sciences has concluded that the debate is over, significant emission reductions are needed, and delay only makes the job harder. The evidence continues to pile up that we're already suffering dangerous climate impacts: stronger hurricanes, melting ice caps, killer heat waves, and severe droughts.

Scientists have recently detected accelerated melting of the Greenland and West Antarctic ice sheets much faster than anyone expected. If either of these ice sheets melts away, sea level rise will be more than 20 feet, with utterly disastrous implications for Louisiana, Florida, New Jersey, and low-lying regions all around the world. There's only a short window of time to stop this from happening.

We have a reasonable chance to avoid this if we can keep atmospheric concentrations from rising above 450 parts per million. And we can do this only if we stop U.S. emissions growth within the next 10 years, and cut emissions by at least half over the next 50 years. If the U.S. acts on this scale, together with similar cuts by developed countries and limiting emissions growth from developing countries, we could keep the world from exceeding that 450-part-per-million level.

So, here is our choice, as indicated in this chart. If we start acting soon, and work with other countries for comparable actions, we can do this with a realistic, achievable annual rate of emission reduction, the green line, something on the order of 2.8 percent reduction per year. But if we delay the start of these reductions for another 10 years, the job becomes much harder, and the rate of reduction that would have to be achieved doubles. It's immensely more difficult if we wait.

Voluntary measures won't work. In 2002, the President recommitted the U.S. to stabilizing greenhouse concentrations at non-dangerous levels. That's the objective of the treaty his father entered into and that we ratified. He says his goal is to slow, stop, and reverse emissions growth, but the target that he has set, even if it was met, would still cause U.S. emissions to rise by 14 percent between 2002 and 2012. That's exactly the same rate that grew in the prior 10 years.

We need mandatory limits. The Senate voted for a mandatory market-based limit that would slow, stop, and reverse emissions growth last year. State and local governments are leading. Many other constituencies are coming on. More than 80 evangelical leaders called for mandatory limits earlier this year. And, just yesterday, appearing before the Senate Energy Committee, some of the

largest electric utility suppliers of generating equipment and electricity customers called for mandatory limits. What they said is, they're making 50-year investments, and they need to know what the rules of the road are, because they can't make sensible investments without knowing what the limits are going to be. Other countries get this, too.

The problem with the Asia-Pacific Partnership is that the United States comes to the table with nothing more than a wish to talk about voluntary cooperation. The U.S.—it's not a bad idea, in principle, to work with a smaller set of key countries. That's what Tony Blair set out to do in a group called the "G8 plus 5," with the G8 and China, India, Mexico, Brazil, and South Africa. But the U.S. won't play in this ballpark. Instead, we're trying to construct our own ballpark, with our own rules, for a voluntary-only approach. And this isn't going to lead to anything significant.

The solution lies in embracing the market. But, as the companies testified yesterday to the Energy Committee, without mandatory limits on emissions, there is no market. So, without mandatory limits, the Asia-Pacific Partnership is just theater, theater that does not protect the American people from stronger hurricanes, heat waves, drought, coastal inundation.

American business "gets it." American leaders, at the State and local level, "get it." A majority of the Senate "gets it." And our partners and competitors abroad "get it." It's time for action at the national level.

Thank you.

[The prepared statement of Mr. Doniger follows:]

PREPARED STATEMENT OF DAVID D. DONIGER, POLICY DIRECTOR, CLIMATE CENTER, NATURAL RESOURCES DEFENSE COUNCIL

Thank you for the opportunity to testify today on science and policy issues related to the Asia-Pacific Partnership. My name is David Doniger, and I am Climate Policy Director at the Natural Resources Defense Council (NRDC). NRDC is a national, nonprofit organization of scientists, lawyers and environmental specialists dedicated to protecting public health and the environment. Founded in 1970, NRDC has more than 1.2 million members and online activists nationwide, served from offices in New York, Washington, Los Angeles, and San Francisco. I have worked for NRDC in two separate stints for nearly 20 years. I also served in the Environmental Protection Agency in the 1990s, where I helped direct the Clinton Administration's domestic and international policy on global warming.

The Asia Pacific Partnership is symptomatic of the current Administration's failure to take meaningful action to curb global warming either at home or abroad. The U.S. has limited the terms of engagement with the other participating countries to strictly voluntary measures and technology cooperation backed by what can only be described as token governmental funding. On these terms, the Partnership *cannot* make a difference. It is simply an exercise in looking busy while other nations engage in real efforts internationally and while business leaders, elected officials, and others work toward real policies here at home.

Time Is Running Out

Most serious climate scientists now warn that there is a very short window of time for beginning serious emission reductions if we are to avoid truly dangerous greenhouse gas concentrations without severe economic impact. The science debate is over. Significant emission reductions are needed, and delay only makes the job harder. As the National Academy of Sciences recently stated:

> Despite remaining unanswered questions, the scientific understanding of climate change is now sufficiently clear to justify taking steps to reduce the amount of greenhouse gases in the atmosphere. Because carbon dioxide and some other greenhouse gases can remain in the atmosphere for many decades, centuries, or longer, the climate change impacts from concentrations today will

> likely continue well beyond the 21st century and could potentially accelerate. Failure to implement significant reductions in net greenhouse gases will make the job much harder in the future—both in terms of stabilizing their atmospheric abundances and in terms of experiencing more significant impacts. [1]

The evidence continues to pile up that we are *already* suffering dangerous climate impacts due to the build-up of carbon dioxide that has already occurred: stronger hurricanes, melting ice caps, killer heat-waves, and severe droughts. Scientists have recently detected accelerated melting of the Greenland and West Antarctic ice sheets—much faster melting than anyone had expected. If *either* of these ice sheets melt away, sea levels will rise more than *20 feet,* with utterly disastrous implications for Louisiana, Florida, and other low-lying regions of the country and around the world.

There is only a short window of time to stop this from happening. Since the start of the industrial revolution, carbon dioxide concentrations have risen from about 270 parts per million (ppm) to more than 380 ppm today, and global average temperatures have risen by more than one degree Fahrenheit over the last century. A growing scientific consensus is forming that we face extreme dangers if global average temperatures are allowed to increase by more than 3.5 degrees Fahrenheit. We have a reasonable chance of staying within this envelope if atmospheric CO_2 concentrations are kept from exceeding 450 ppm and then rapidly reduced. We still can stay within this 450 ppm target—but only if we stop U.S. emissions growth within the next 5–10 years and cut emissions by at least half over the next 50 years. U.S. action on this scale—together with similar cuts by other developed countries and limited emissions growth from developing countries—would keep the world within that 450 ppm limit.

So here is our choice. If we start cutting U.S. emissions soon, and work with other developed and developing countries for comparable actions, we can stay on the 450 ppm path with a realistic, achievable annual rate of emission reductions—one that gradually ramps up to about 2.8 percent reduction per year.

But if we delay a serious start and continue emission growth at or near the business-as-usual trajectory for another 10 years, the job becomes much harder—the annual emission reduction rate required to stay on the 450 ppm path jumps two-fold, to 5.7 percent per year. In short, a slow start means a crash finish—the longer emissions growth continues, the steeper and more disruptive the cuts required later. (See *Figure 1.*)

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[1] National Academy of Sciences, *Understanding and Responding to Climate Change: Highlights of National Academies Reports,* p. 16 (October 2005), *http://dels.nas.edu/dels/rpt_briefs/climate-changefinal.pdf.*

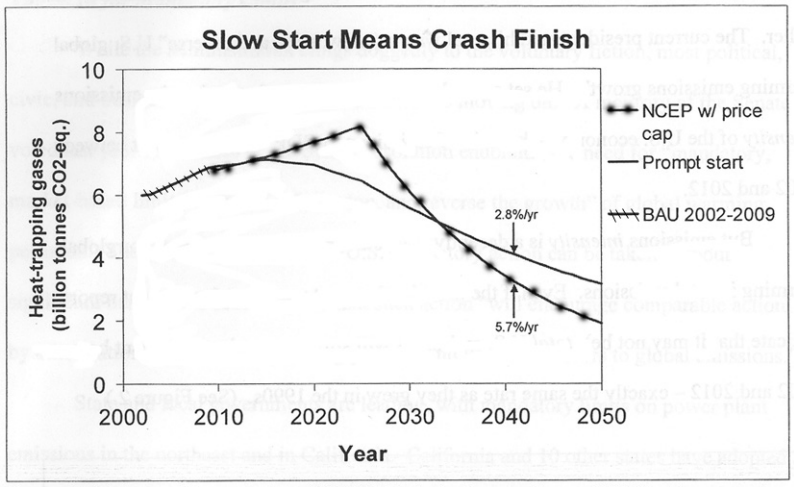

Figure 1. Total cumulative emissions (2002-2050) for both scenarios are 75 billion tonnes carbon-equivalent (GtC). This budget is an indicative U.S. share (20%) of the global emissions budget required for stabilizing the concentration of CO_2 in the atmosphere at 450 ppm. The "Prompt start" (green) curve follows the emission reduction schedule proposed above. With reductions starting in 2016, emissions need to decline by 2.8%/year from 2026-2050 to result in total cumulative emissions of 75 GtC over the period. The "NCEP w/ price cap" (red) curve follows the emissions path projected by EIA through 2025 for the cap and trade policy proposed by NCEP (including the proposed "safety valve" price cap starting at $7/ton$CO_2$). To meet the same 75 GtC emissions budget, emissions must decline much more rapidly, by 5.7%/yr, from 2026-2050.

Voluntary Measures Won't Work

The President's "voluntary" policy is not working. The inadequacy of a voluntary program is plain to see for a growing number of business leaders, state and local elected officials, and a majority of the U.S. Senate, as well as to nearly all other nations.

In 2002, President Bush recommitted the United States to "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system"—the objective of the climate change treaty (the U.N. Framework Convention on Climate Change) adopted and ratified by his father. The current President said his goal was to "slow, stop, and reverse" U.S. global warming emissions growth. He set a purely voluntary target of reducing the emissions *intensity* of the U.S. economy—the ratio of emissions to GDP—by 18 percent between 2002 and 2012.

But emissions *intensity* is a deceptive measure, because what counts for global warming is *total* emissions. Even if the President's target were met (and recent reports indicate that it may not be), total U.S. emissions will still increase by 14 percent between 2002 and 2012—exactly the same rate as they grew in the 1990s. (See *Figure 2.*)

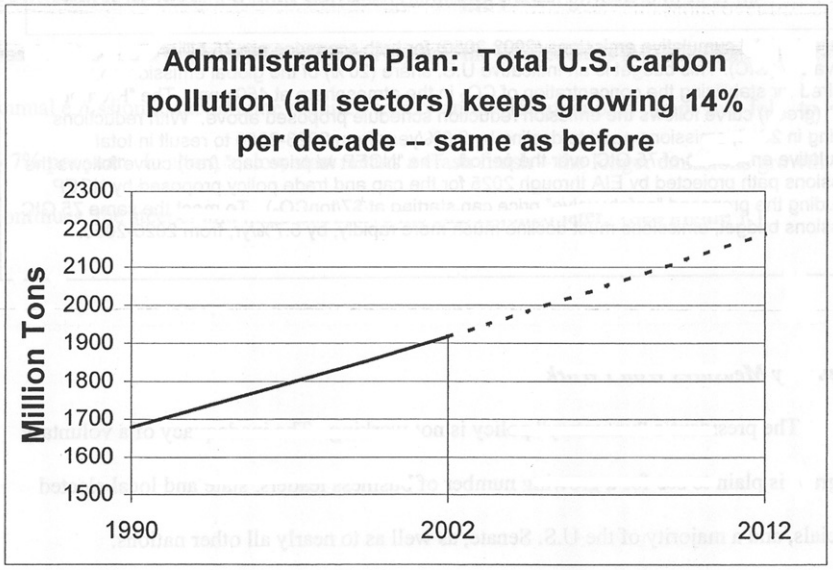

Figure 2.

The Need for Mandatory Limits

While the Administration clings doggedly to the voluntary fiction, most political, civic, and business leaders in the United States are moving on. A majority of the Senate voted last year for a Sense of the Senate resolution endorsing the need for "mandatory, market-based limits" that will "slow, stop, and reverse the growth" of global warming pollution. The resolution affirms that U.S. mandatory action can be taken without significant harm to the economy and that such action "will encourage comparable action by other nations that are major trading partners and key contributors to global emissions."

State and local governments are leading, with mandatory limits on power plant emissions in the northeast and in California. California and 10 other states have adopted limits on global warming emissions from motor vehicles. Many other states have adopted standards to increase the percentage of renewable power generation. Stakeholder processes to address global warming are underway or in development in a growing number of states in all regions of the country.

The constituency for real action is growing. Earlier this year, more than 80 evangelical leaders called for mandatory limits on global warming pollution, citing their duty to care for God's creation.

Just yesterday, appearing before the Senate Energy Committee, some of the largest electric utilities, suppliers of generating equipment, and electricity customers called for mandatory limits. Huge companies such as Duke Energy, Exelon, and GE said that voluntary programs won't work and that they need certainty and clear market signals in order to make sensible investments in new power plants that will last 50 years. Big electricity consumers like Wal-Mart endorsed mandatory limits and committed to cut their energy use and emissions through investments in energy efficiency and renewable energy.

They all get it. Voluntary programs and tax incentives are insufficient to get these technologies deployed at a sufficient scale and speed to avoid a climate catastrophe. The market conditions for these new investments will not be created without a limit on CO_2 emissions.

Mandatory Limits Abroad

Other countries get it too. Not just the Europeans, but developing countries as well. In December 2005, more than 180 countries committed to new negotiations on mandatory steps to follow and supplement the current Kyoto Protocol after 2012. What struck me most was the near consensus—save only our own government—on the market logic of mandatory requirements. The European Union, of course, has

taken the tools of emissions trading pioneered in this country and implemented a mandatory cap-and-trade program for CO_2. China and India now understand the market-based framework offers them the potential for new flows of capital to finance cleaner energy development—with an obvious pay-off for them in terms of cleaning up their awful local pollution problems, in addition to reducing their CO_2 emissions.

We need to recognize that key developing countries are also already taking actions to reduce their global warming emissions growth. For example:

- China's GHG emission intensity has improved due to macroeconomic reforms and energy sector liberalization. China's Eleventh Five-Year Plan, which goes into effect this year, calls for a 20 percent reduction in energy use per unit of GDP by 2010. China's renewables sector is the world's fastest growing, at more than 25 percent annually. China has enacted a new Renewable Energy Law and vowed to meet 15 percent of its energy needs with renewable energy by 2020.[2]
- China has far surpassed the U.S. fuel efficiency standards for vehicles of all classes. China's new fuel efficiency standards require vehicle classes to achieve on average 34.4 mpg by 2005 and 36.7 mpg by 2008 (normalized for the CAFE test cycle). American fuel efficiency standards are calculated using the average fuel use of the entire fleet sold by an automaker. However, in China, as well as Japan, the standards require that each model sold meet the criteria. China's Standardization Administration finalized fuel economy standards for light-duty vehicles—cars and light trucks, including sport utility vehicles (SUVs)—that are up to twenty percent more stringent than U.S. CAFE standards. The standards will save 60 million tons of carbon in 2030, displacing 517 million barrels of oil in that year—equivalent to removing 35 million cars from the road. China's leaders are serious about enforcing the standards—vehicles that don't meet the standards cannot be certified for sale or operation—and intend to broaden them to include heavy duty trucks.[3]
- Brazil's GHG emission intensity levels have risen in recent years because of increased gas use, which increases emissions relative to hydropower, on which Brazil has traditionally relied. However, in the transportation sector Brazil has saved 574 million tons of CO_2 since 1975 through its development of ethanol, which is roughly 10 percent of Brazil's CO_2 emissions over that period.[4]

Even though they have already begun to act, other countries (both developed and developing) are likely to take U.S. action or inaction heavily into account in deciding on their future actions. Our leadership is fundamental.

Chinese and Indian officials are working with the Europeans and others on serious steps to make the market-based system work—for example, developing limits or benchmarks for emissions in key sectors, in order to set the baseline for earning emissions credits that can be sold through the marketplace to raise funds for cleaner energy development. The stage is set, over the next several years, to develop a win-win deal that helps cut emissions, opens markets for firms in industrial countries while cutting their domestic compliance costs, and draws all key nations into a global effort to prevent global warming.

U.S. on the Sideline, or Worse

Where does the Asia-Pacific Partnership fit into this? First, in principle, it is not a bad idea to work with a smaller set of key countries. That is what Prime Minister Tony Blair set out to do last year in forming a group known as the "G8 plus 5"—the major industrial nations plus China, India, Mexico, Brazil, and South Africa. A consensus on a new market-based agreement among over 20 countries—including Europe, the U.S., Japan, and those five developing countries—would cover the bulk of world emissions and go a long way to solving the global warming problem.

But the U.S. has refused to play ball in this ballpark. Instead, the Bush Administration has sought to manufacture another ballpark—cutting out the Europeans—and run the game on its own rules.

The results of the AP6 process so far are truly meager. Limited by the U.S. "voluntary only" approach, the meeting in Australia was nothing more than a gabfest about process and no product. The participants released a grab bag of announcements about sharing technology experiences and agreeing to meet again. The U.S. put a measly $50 million on the table—not even enough to build one clean electricity plant.

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[2] "Gov't demands more focus on green energy," *China Daily* (Jan. 13, 2006).

[3] An and Sauer, *Comparison of Passenger Vehicle Fuel Economy and GHG Emisson Standards Around the World,* Prepared for the Pew Center on Global Climate Change, December 2004.

[4] Baumert, Herzog, and Pershing, *Navigating the Numbers: Greenhouse Gases and International Climate Change Agreements,* World Resources Institute 2005, ISBN: 1–56973–599–9.

China, India—and the U.S.—are planning to build hundreds of new power plants powered by coal. If nothing is done, these plants will emit huge amounts of CO_2 for 50 years and foreclose any chance to stave off a climate catastrophe. But if we act at home and work with them abroad, we can change this future, by investing in a new generation of coal plants that dispose of their CO_2 underground, not in the atmosphere, as well as by increasing investments in energy efficiency and renewable power. This will not happen under the voluntary AP6 as presently structured. We need more than that.

This is not to say that the solution lies in more government funding. It does not. The solution lies in embracing the market. But as the companies testified yesterday to the Energy Committee, without mandatory limits on emissions, there is no market.

Without mandatory limits, the AP6 is just theater—theater that does not meet the interests of China, India, and other countries in constructing a real system that fuels cleaner development and cuts emissions. And it is theater that does not protect the American people from stronger hurricanes, heat-waves, drought, and coastal inundation that is coming from global warming.

If we are to prevent catastrophic global warming, we have to take mandatory action—both at home and internationally. No serious environmental challenge was ever solved by voluntary action alone. American business gets it. American leaders at the state and local level get it. Our partners and competitors abroad get it. It's time for our national leaders to get it, and to act.

Senator VITTER. Thank you, Mr. Doniger.

And, Senator Lautenberg, why don't we start with your questions?

Senator LAUTENBERG. Thanks very much, Mr. Chairman.

I am glad to have a chance to see our—talk to our witnesses here. I didn't realize that Mr. Connaughton was going to be released so quickly, but——

Senator VITTER. Yes, and I apologize. He had a conflict at 4 o'clock. And so, I was a little uncertain about your plans, so I released him. And he agreed to come back to you personally, answer any submitted questions, or do anything we would like in the near future.

Senator LAUTENBERG. All right. We'll take advantage of his offer.

Mr. Doniger, all of you, I'm glad to see you. I may not agree with you, but, nevertheless, the process of trying to learn what it is that I see that I shouldn't believe, I'm trying to figure that out, but—and when I look at the evidence, as I see it—and some of these places are directly familiar to me, having been there—Antarctica, for instance. I've been down to the South Pole. I wanted to see what our scientists at the National Science Foundation were doing. And this was about 5 years ago. And it was obvious then that signs of problems were starting to manifest themselves. The reduction in some of the penguin populations and the melting of significant ice caps there. And I was reminded, in my conversations with them there, that some 70 percent of the world's fresh water lies stored in the ice there, and the—we've seen places—they've tried to figure out which State the size of which the ice floe represents, but they've been coming off in States, and I fear that they're going to get to bigger and bigger States, not little ones like Rhode Island or New Jersey or what have you.

So, Mr. Doniger, how should we address the challenges? We heard that volunteerism is a noble enterprise and that we've got time. I don't understand that, that ability to focus totally on the future and say that, "Well, we're working on these things that will, in a number of years, bring them into the levels that we want." But, meanwhile—that's assuming that we—many of us won't be

here to see whether the test has passed, but our children and our grandchildren will be. How do we address the challenges posed by increased emissions from India and China, after Kyoto? Is the partnership a reasonable way to do it? What would you think?

Mr. DONIGER. Well, I believe what we need is a regime with mandatory limits that creates a marketplace in which private-sector capital, not just token governmental funds, have reasons to flow to—into the projects and the programs that are going to reduce emissions. We heard, earlier, that there are hundreds of coal-fired power plants to be built in China and India—and, I might add, planned in the books in the United States, as well, more than 100. If these power plants are built in the conventional manner, without CO_2 capture, then we're sunk—and I use that verb advisedly—because the only way to stave off the melting of Greenland, the melting of the ice caps, and many of these other impacts, is to curb global emissions on a pattern like this, in my chart, and to do it by the middle of the next century. Otherwise, we're sunk. And the only way to get the kind of capital moving that would make the difference to cause the Chinese, the Indians, and, for that matter, the Americans, to build coal gasification plants with carbon storage—carbon disposal underground, built into them, instead of conventional plants, is if there's a price signal. And the price signal can come from putting in a cap and—a declining cap, over time.

If we—many people, including my colleagues to—on this panel, will say, "Well, this is very expensive." I would say, "It gets more expensive, the longer we put it off." And the analogy is that if you are trying to stop at a stop sign, you cannot wait til the very last minute to jam on the brakes. Your forehead will hit the window, and you'll end up in the middle of the intersection. And that's the path we're on now. If we start putting on the brakes more gently now, we can avoid the crash that awaits us.

Senator LAUTENBERG. The—did you have a chance to see—it was on *60 Minutes* the other night—and that was the report that was produced by climate scientist James Hansen. And he did that—that was based on conversations with NOAA scientists. And the redaction that was done—I don't know whether you saw that—it was on television, very clear, and I'm sure it's available, general distribution. Did you look at it closely enough to see that there were things there that startled you, in terms of——

Mr. DONIGER. Well, I'm a former government official, and I know that there is a review procedure for government reports. But I have never seen anything quite like what Mr. Cooney did, which is to change the meaning of reports to inject uncertainty where science—scientists had made quite definitive statements—to try to fuzz it up. And that isn't the way we did things, and it isn't the way things should be done.

Senator LAUTENBERG. There was a 10-year timeline that was mentioned there that said if we don't get moving on this before 10 years hence, in a serious way, that there was imminent danger. And I saw that—the word crossed out. It said "could be" imminent danger. Well, it's quite a difference.

Mr. DONIGER. Well, and the conclusion that was represented in the draft, and that was edited out, was reached without the benefit of the most recent science, which tells us that some of this melting,

of Greenland, for example, is happening at an accelerated rate, much faster than was expected. And—but, still, Hansen and others are saying if we start to act quickly, and we get the—follow the President's own goal, to slow, stop, and reverse emissions—if we go beyond the slow part to the stop part and the reverse part, and we do it soon enough, we can avert this catastrophe. We can keep our cities above water.

Senator LAUTENBERG. Thanks very much. I don't want to——

Mr. Chairman?

Senator VITTER. OK. Dr. Thorning, you made an interesting point in some of your written testimony about industry leaving Kyoto Protocol countries for non-Kyoto Protocol countries. Can you expand on this point and how we combat that phenomena, in terms of a global marketplace?

Dr. THORNING. I think indications from Europe are that some energy-intensive industries that are unable to stay competitive with the price of carbon, as it is, in Europe—and I think it recently hit about $120-a-metric-ton of carbon for the right to emit a ton of carbon—are having to relocate. A major aluminum company was forced to shut down some plants in Germany. In the U.K., manufacturers are increasingly concerned about the increase in electricity prices. It went up about 34 percent in the U.K. last year, and a portion of that is due to the emission trading system. In the studies that the—our sister affiliate, the American Council for Capital Formation, has released in years past, we have seen, if the U.S. were to try to force emissions down under a mandatory system, there would be leakage of our industry-intensive sector of approximately 15 percent. This was studied by Rich Richels and the late Professor Alan Manne, as well as Tom Rutherford, at the University of Colorado. And those are all on the ACCF website, documenting the leakage that we would experience.

So, I think my suspicion is that, over time, as there is some growth in Europe and as the targets get tighter and tighter and harder to meet, they will be looking at approaches based more on a voluntary approach, based more on a transfer of technology to the developing countries. I think the fact that Prime Minister Tony Blair, last week, made a speech, I think, in New Zealand, saying that U.K. was one of the very few countries that would probably meet its Kyoto target. It was a significant statement. He realizes most of the other EU countries are way above their Kyoto targets, and have no hope of meeting the targets under their mandatory system, because to impose taxes high enough to actually meet their Kyoto targets would be political suicide.

So, it seems to me the approach that the current Administration is following is the only practical one. If we want to do practical things to reduce greenhouse gases, we have to do it in a way that doesn't inflict so much economic pain that it's unsustainable.

Senator VITTER. Mr. Doniger?

Mr. DONIGER. May I just quickly respond? Dr. Thorning and I have completely different information coming out of Europe. And the European emissions trading system is working. The European countries are implementing that, even before their Kyoto period. So, it's no surprise that they're above the targets now. They're on track to develop more policies, and implement them, to meet those

targets. And these predictions of failure all overlook an important mechanism included in the Kyoto Treaty, which is the international emissions trading that will allow any country which is above its target to purchase credits that come from other countries.

So, the Europeans are on time and under budget. They're going to be complying with Kyoto. And it's possible that the European countries will think carefully about how far they go, in isolation. They want to see the United States shoulder its own responsibilities and participate in the system. The Chinese are ready to do some things, but not before the United States, the world's biggest polluter, takes on a share of its responsibilities.

Senator VITTER. In general, Mr. Doniger, how would you address the general concern that if you have a cap system, a cap-and-trade system, even in the industrialized West, you're going to create movement of industry to non-capped parts of the world?

Mr. DONIGER. I think that if we were to adopt a cap in this country, that is the fastest way to get important sectors of industry in other countries to also take on limits, caps or performance standards. In other words—I guess what I'm saying is, I wouldn't expect the United States to take on a 50-year regime in isolation from other countries, but if the United States takes a step forward, the Europeans are already acting, the Japanese are already acting, and the Chinese and the Indians are signaling that they would be ready to do things, too. Taking into account that they start from a much lower level of economic development per capita emissions, they would be different things, but they would be ready to act. We are the key.

Senator VITTER. OK, I think those are all the questions I have.

Senator you have any wrap-up?

Senator LAUTENBERG. No, just, for a moment, Mr. Chairman. I'm looking at Kilimanjaro's snow glaciers. They're melting, likely to disappear completely, it's said, by 2020. The ice on the summit, that was formed more than 11,000 years ago, has dwindled by 82 percent over the past century.

Mr. Doniger—[off mic]—of our Navy about activities that they might have to focus on the last half of this current century. And that would be to fight off refugees seeking higher land coming from countries that are inundated by floods. And the predictions made by the report—this was quick work by my staffperson here—the predictions made by the report include, "Future wars will be fought over the issue of survival, rather than religion, ideology, or national honor. By 2007, violent storms smash coastal barriers and render large sections of the Netherlands uninhabitable." They talk about so many places here.

And I'd like to submit this for the record, Mr. Chairman.

Senator VITTER. Without objection.

[The information referred to follows:]

Guardian Unlimited—The Observer, February 22, 2004

CLIMATE CHANGE—KEY FINDINGS OF THE PENTAGON REPORT

Future wars will be fought over the issue of survival rather than religion, ideology or national honor.

By 2007 *violent storms* smash coastal barriers rendering large parts of the Netherlands inhabitable. Cities like The Hague are abandoned. In California the delta

island levees in the Sacramento river area are breached, disrupting the aqueduct system transporting water from north to south.

Between 2010 and 2020 Europe is hardest hit by climatic change with an average annual temperature drop of 6F. Climate in *Britain becomes colder* and drier as weather patterns begin to resemble Siberia.

Deaths from *war and famine* run into the millions until the planet's population is reduced by such an extent the Earth can cope.

Riots and *internal conflict* tear apart India, South Africa and Indonesia.

Access to *water* becomes a major battleground. The Nile, Danube and Amazon are all mentioned as being high risk.

A "significant drop" in the planet's ability to sustain its present population will become apparent over the next 20 years.

Rich areas like the U.S. and Europe would become *"virtual fortresses"* to prevent millions of migrants from entering after being forced from land drowned by sea-level rise or no longer able to grow crops. Waves of boatpeople pose significant problems.

Nuclear arms proliferation is inevitable. Japan, South Korea, and Germany develop *nuclear-weapons capabilities,* as do Iran, Egypt and North Korea. Israel, China, India and Pakistan also are poised to use the bomb.

By 2010 the U.S. and Europe will experience a third more days with peak *temperatures above 90°F.* Climate becomes an "economic nuisance" as storms, droughts and hot spells create havoc for farmers.

More than 400m people in subtropical regions at grave risk.

Europe will face huge internal struggles as it copes with *massive numbers* of migrants washing up on its shores. Immigrants from Scandinavia seek warmer climes to the south. Southern Europe is beleaguered by refugees from hard-hit countries in Africa.

Mega-droughts affect the world's major breadbaskets, including America's Midwest, where strong winds bring soil loss.

China's huge population and food demand make it particularly vulnerable. *Bangladesh* becomes nearly uninhabitable because of a rising sea level, which contaminates the inland water supplies.

Senator LAUTENBERG. And to ask whether this tipping point—Dr. Montgomery or Dr. Thorning, do you see any need to hasten our pace here and try to get things really underway before it's too late, which has been described by Mr. Doniger and others as a 10-year cycle?

Dr. MONTGOMERY. Senator Lautenberg, I think the issue is not on the side of the climate science, but the issue is what it is possible to do, in what time frame. Even if we accept Mr. Doniger's proposal that, in the long-run, we must stabilize greenhouse gas emissions at a—greenhouse gas concentration at 450 parts per million, he's already drawn two ways that we can get to that 450-part-per-million concentration goal. The choice is what cost we are willing—we incur in choosing to do something early to reduce emissions, versus making a choice about developing technologies. I think the fact is that technologies that can provide sufficient energy at an affordable cost with zero carbon emissions, which is what, ultimately, it takes to achieve stabilization of concentrations, simply do not exist today.

The difference between the red and the green line that Mr. Doniger drew there, between now and 2030, is immensely costly because of the lack of those technologies that can provide energy with very low carbon emissions at an affordable cost today.

If we devote our resources—instead of trying to find small reductions in emissions at high cost today, if we devote those resources, developing the breakthrough technologies that can provide the energy that we need with zero carbon emissions at some point in the future, that other gap between the green line and the red line beyond 2030 can be quite affordable. It's a matter of cost and a mat-

ter of whether we put the resources today into developing the technologies that we don't have, that are required in order to stabilize greenhouse gas emissions—greenhouse gas concentrations, or whether we put those resources into much more expensive and much smaller reductions that are possible today.

I think that's the choice. It's not a question of whether a 450- or a 550- or a 750-part-per-million is what we should choose. Whichever of those we choose requires to—implies stabilization of concentrations. We don't have the technologies today that it takes to do that, we do have those technologies to make them affordable, then those—then there is nothing wrong with that crash reduction later. That's exactly what we want to do, which is develop the technology first.

Analogies to putting on the brakes are completely beside the point. We actually have tools for looking at the economics of this, and thinking about when technologies can become available that let us address the question directly. And they all support the notion that the technology development is absolutely critical, and dwarfs the emission reductions that would be affordable today.

Senator LAUTENBERG. Dr. Thorning, do you have any comment to make on this?

Dr. THORNING. I'd just like to add that—kind of backing up what Dr. Montgomery said, there was a Department of Energy study released by the Energy Information Administration about 4 or 5 years ago, that looked at that question of early start versus late start, and they concluded that the cost of meeting a Kyoto target, as well as others, would be reduced if we spent the time, early on, trying to develop the technologies, rather than beginning to reduce emissions immediately.

Senator LAUTENBERG. Your response, Mr. Doniger?

Mr. DONIGER. Well, the truth is that the Federal R&D budget for these sorts of things is, if anything, shrinking. And it was never big enough, and can't imagine it being big enough, to mount an effort on this scale. You have to make it a private-sector effort. And the private sector is saying, "We're ready to go start building gasification plants. We're ready to start doing carbon storage in old oil fields to pump more oil out." But right now there is a cost gap, because there's no price of dealing with carbon. If you give us a cap-and-trade program, a mandatory limit, it will signal that that cost gap is either gone or going to go away, and it makes sense to make those investments.

There's already one such plant being built by BP and, I think, Southern California Edison, in Long Beach. They've committed to build this. They're going to have that plant up and running and storing carbon underground before the Federal FutureGen Program—before the first Federal FutureGen plant.

So, if the private sector were properly motivated, we could get this done a lot faster than with this R&D program, this sort of Harry Potter R&D program for which there's no funding.

Senator LAUTENBERG. Yes. Well, the question is, How does one determine cost? Is cost expressed strictly in dollar increments, or is cost expressed in the—perhaps destroying a way of life as we currently know it? I assume all of you are aware of the fact that an unmentionable, a—it's more than four letters, but—the word

was not able to be used, and that was "nuclear." And now there are several applications for nuclear plants pending in front of the NRC. And it would have been unheard of. And, frankly, I think it's a rather—it's a move, I think, induced by desperation, because we're locked into the fossil-fuel disappearance, eventually, in any event. So, I think things are changing, and the measurement of cost is a significant factor, in my view. I look at it from my grandchild's—my grandchildren's eyes.

Thank you very much.

Thanks, Mr. Chairman.

Senator VITTER. Thank you very much.

With that, we'll have some follow-up questions we'll submit to you and get your answers for the record.

Thank you very much for being here and for your participation.

The hearing is adjourned.

[Whereupon, at 4:35 p.m., the hearing was adjourned.]

A P P E N D I X

PREPARED STATEMENT OF HON. DANIEL K. INOUYE, U.S. SENATOR FROM HAWAII

It is important that we examine the current and future role of science in the Asia-Pacific Partnership. Thus far, I am not satisfied that this initiative will respond to the concerns of our scientists, our citizens, or Congress.

While it is essential that we work closely and respectfully with our Asian Pacific partners, I am surprised at the complete lack of connection between the proposed Federal expenditures and any measurable goals or achievements that will help us address the very real threats of climate change in the Pacific.

The people who live in these areas, including Hawaii, the U.S. territories, and other Pacific island nations, are facing these threats already, and the projections indicate further increases in sea level rise and ocean warming, spelling disaster for our island economies.

I urge the Administration to take a hard look at this proposal and meet with my constituents to hear their concerns and better understand these threats. Only then can Congress provide any support for this initiative.

WRITTEN QUESTIONS SUBMITTED BY HON. DANIEL K. INOUYE TO HON. JAMES L. CONNAUGHTON *

Question 1. Has the Administration consulted with the Hawaii and the Pacific islands representatives on the urgency of concerns about impacts of climate change in the Pacific, and discussed establishing goals and targets for meaningful action? Please be explicit as to who you have met with and what they have asked for.

Question 2. Why is the United States, but not Japan, or the other Asian nations, putting money forward for this? How much can we expect from these partners over the next few years?

Question 3. Since none of the Pacific island nations. or anyone in Hawaii that we have spoken to, appear to be involved, how much money and time would it take to confer with scientific and climate change experts in my state, as well as Pacific island stakeholders, to establish scientifically-based standards that will help explain to Congress what we can expect from this investment?

WRITTEN QUESTIONS SUBMITTED BY HON. FRANK R. LAUTENBERG TO HON. JAMES L. CONNAUGHTON *

Question 1. Why did prominent government scientists recently tell the news media that their access to the press was being controlled and that their documents were being edited to suit the Administration's political purposes? If there was no problem, why did NASA rewrite their policies on this issue?

Question 2. Is the Administration going to allow California to set its own limits on greenhouse gas emissions from vehicles?

Question 3. Is there any circumstance under which this Administration would reconsider its opposition to any mandatory controls on greenhouse gases?

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* Response to written questions was not available at the time this hearing went to press.