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EXAMINING APPROACHES EMBODIED IN THE ASIA PACIFIC PARTNERSHIP

HEARING

BEFORE THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS UNITED STATES SENATE

ONE HUNDRED NINTH CONGRESS

SECOND SESSION

SEPTEMBER 20, 2006

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ONE HUNDRED NINTH CONGRESS
SECOND SESSION

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EXAMINING APPROACHES EMBODIED IN THE ASIA PACIFIC PARTNERSHIP

WEDNESDAY, SEPTEMBER 20, 2006

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

The committee met, pursuant to notice, at 4 o'clock p.m. in room 406, Dirksen Senate Office Building, the Hon. James M. Inhofe (chairman of the committee) presiding.

Present: Senators Inhofe, Jeffords, Lautenberg, Bond, Boxer, Carper, Murkowski.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. Our meeting will come to order. We have a policy of starting on time, but I am going to refrain from any opening statements until Senator Jeffords arrives. Any word on that? He is here. All right, here we go. You see, I wasn't going to start without you.

Today's hearing is on the Asia Pacific Partnership and the underlying approaches embodied in this Administration's initiative. Before we proceed, let me just once again state my belief that global warming is an alarmism and it is a type of a hoax. You watch the new science come in. It is something new almost every day. Most recently, the geophysical research letters, that was about 3 days ago, finally came to the astounding conclusion that climate change has something to do with the sun. I am sure that shocked a lot of people.

Recent projections of the Russian Academy of Sciences is that we are about to enter a global cooling phase. Earlier this week, a study of the research letters found that the sun is responsible for about 50 percent of the observed warming since 1900. So today's hearing should not be misconstrued as a global warming hearing.

The climate alarmism that we hear in the media about impending planetary doom has taken on a striking resemblance to the classic story of Chicken Little. As you would recall, the ending is not pleasant, not because the sky fell, but because Chicken Little and his followers reacted unwisely out of fear.

The lesson? Having the courage and wisdom to act wisely when faced with fear, but this lesson appears to have been forgotten in the modern sky is falling alarmism of global warming. One proposed, yet unwise, course of action is to impose hard caps on carbon dioxide. It is wisely recognized that these are feel good proposals that would do little to seriously address manmade climate change,

even assuming the alarmists are right about the science, which they are not.

The Kyoto Protocol, even if the United States had joined and every nation complied, would have only reduced global temperatures by 0.07. This is a very interesting chart here, Senator Carper. This is a chart that was put together that said if everybody complied, and I am talking about India, China, the United States and everyone else, this would be the effect by the year 2050, hardly even a measurable effect. Yet all but two of the EU 15, the European Union 15 countries who signed, all but two of them have not reached their targets because the reality is that a cap on carbon is a cap on the economy through the rationing of energy.

In the United States alone, the costs of complying with Kyoto would have cost $2,700 per household, and 2.4 million jobs, according to the Horton Econometric Survey. Any approach to climate change must begin with the realization that energy growth is essential to pursuing our many competing priorities, and any approach which threatens that is unsustainable.

I look forward to the testimony of our witnesses at today's hearing on how to pursue notable goals and how to prioritize them in the context of the Asia Pacific Partnership. Abundant growing energy has been and will continue to be a major driving force behind our economy here in the United States. Our stock market is nearly record highs today. The wages and salaries are increasing 10 percent annually. The gross domestic production is expanding faster than any other major industrialized nation, up 20 percent since President Bush's 2003 tax cut. And our energy use is also quickly expanding. The fact is, energy and economic growth go hand in hand.

The Asia Pacific Partnership is not about climate change, but about working to achieve an energy abundant future that looks at the whole picture. Through technology transfers, information sharing, and other aspects of the partnership, the members will work toward growing their energy supplies, while reducing the serious problem of air pollution, such as SOx, NOx, and mercury in some of these countries. They will work toward cost-effective energy efficiency projects, which reduce the amount of fuel necessary to generate the same amount of power, and incidentally, reduce carbon dioxide, along with real pollutants.

And that is why I support full funding for this important Administration initiative. I am particularly interested in the testimony of our two witnesses who will examine why increasing technology is superior to a carbon cap approach. Bjorn Lomborg will examine today's topic from an economic perspective, and Cal Beisner will examine it from an ethical perspective.

We will also welcome Jim Connaughton as our first panelist.

Senator Jeffords.

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

Senator JEFFORDS. Thank you, Mr. Chairman, for holding this hearing.

When President Bush announced the need for the Asia Pacific Partnership, he made the following statement in the fact sheet:

"We know the surface of the earth is warmer and increased greenhouse gases caused by human activity is contributing to the problem." As that statement demonstrates, the debate regarding the existence of global warming is largely over. We need to now turn to solutions to global warming, rather than questioning established facts.

Global warming is here and every day we learn more about the severe consequences it can have for all of us. These effects range from the sea level rise and the dangerous weather patterns, to species extinction and increased disease vectors. In Vermont, our maple syrup production is threatened, as is our ski industry, just to name two of the impacts.

The sooner we act to address climate change, the better off we will be in terms of reducing the environmental harm and overall costs of control. That is why I have introduced the Global Warming Pollution Reduction Act. Based on the latest science, my bill sets out a series of mandatory requirements, as well as research and development programs that would provide a road map for addressing climate change over the next 50 years.

If enacted, my legislation would make it possible for us to address the global warming problem. If, however, we continue to delay, it may come too late. We may go beyond the tipping point and be forced to confront the reality of irreversible climate change.

Unfortunately, the Asia Pacific Partnership is little more than an excuse for further delay. It does too little, too late, and would commit us to many more years of talk with no binding commitments. In the meantime, emissions will increase and it will be nearly impossible for us to avert some of the worst effects of global warming.

Experts tell us that we can act now, using available technologies to reduce carbon emissions cost-effectively. However, without a system of mandatory limits, research and technology deployment alone is not enough. A recent report from the Congressional Budget Office confirms that both mandatory limits and technology-based approaches are required.

We know that neither the Asia Pacific Partnership nor the Administration's voluntary intensity reduction goal will lead to emission decreases. The report commissioned by Australia shows that even under the best-case scenario for the partnership, emissions will still double by the year 2050. Under the Bush Administration's voluntary goal, emissions will increase by 14 percent per decade.

We cannot afford such increases, which will result in years of additional impact. We cannot afford delay and we cannot afford to rely entirely on technology-based approaches such as climate change technology programs. These approaches will not get us where we need to be fast enough.

If this Administration were really serious about climate change, it would propose a system of economy-wide limits on carbon emissions. That would show real leadership worldwide, which is what we need to address this immensely important issue.

Thank you, Mr. Chairman.

[The prepared statement of Senator Jeffords follows:]

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

Mr. Chairman, thank you for holding this hearing.

When President Bush announced the Asia Pacific Partnership, he made the following statement in a fact sheet: "We know the surface of the earth is warmer and an increase in greenhouse gases caused by human activity is contributing to the problem."

As that statement demonstrates, the debate regarding the existence of global warming is largely over. We need to turn now to solutions to global warming, rather than questioning established facts.

Global warming is here, and everyday we learn more about the severe consequences it can have for all of us. These effects range from sea level rise and dangerous weather patterns to species extinction and increased disease vectors. In Vermont, our maple syrup production is threatened, as is our ski industry, just to name a few impacts.

The sooner we act to address climate change the better off we will be, in terms of reducing the environmental harm and overall costs of control. That is why I have introduced the Global Warming Pollution Reduction Act.

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In the meantime, emissions will increase and it will be nearly impossible for us to avert some of the worst effects of global warming. Experts tell us that we can act now, using available technologies, to reduce carbon emissions cost-effectively. However, without a system of mandatory limits, research and technology deployment alone is not enough.

A recent report from the Congressional Budget Office confirms that both mandatory limits and technology-based approaches are required. We know that neither the Asia Pacific Partnership, nor the Administration's voluntary intensity reduction goal, will lead to emissions decreases. A report commissioned by Australia shows that even under the best case scenario for the partnership, emissions will still double by the year 2050.

Under the Bush Administration's voluntary goal, emissions will still increase by 14 percent per decade. We cannot afford such increases, which will result in years of additional impacts. We cannot afford further delay, and we cannot afford to rely entirely on technology-based approaches, such as the Climate Change Technology Program. Those approaches will not get us where we need to be fast enough.

If this Administration were really serious about climate change it would propose a system of economy-wide limits on carbon emissions. That would show real leadership, worldwide, which is what we need to address this immensely important issue.

Senator INHOFE. Thank you, Senator Jeffords.

Senator Murkowski.

OPENING STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM THE STATE OF ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman.

I am not going to take this opportunity to give a speech on climate change or global warming. I think I have made my position clear. We can see in Alaska that our climate is changing, whether it is the impact to some of our forest areas with the spruce bark beetle infestation or the thinning of some of the ice that we are seeing, the increased release of methane gases from permafrost that is melting. We can see it, but what I am here to do today is to listen to some of the comments that we will hear from Mr. Connaughton on how the Asia Pacific Partnership on Clean Development and Climate is actually working.

I happen to believe that if we are to address climate change, we must start first with the technology, and that technology is not going to do us any good if that technology is held just unto ourselves. There has to be a collaboration. There has to be a sharing. There has to be a unity of purpose in what we do.

While it may not be the only answer to how we might reduce our emissions in this country, I do believe that it is part of the answer and so I am anxious to hear if there are any updates from the recent meetings, and to know what progress we are making with some of our neighbors and cooperating countries in this effort.

I appreciate you calling this hearing, Mr. Chairman, and I will look forward to the testimony. Thank you.

Senator INHOFE. Thank you, Senator Murkowski.

Senator Carper.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Thank you, Mr. Chairman.

Mr. Connaughton, welcome. It is good to see you. We welcome you and other guests as well.

As you well know, we are here today to discuss the Asia Pacific Partnership, and as my friend Senator Murkowski said, to learn more about that partnership, touted I think as the latest voluntary action by the Administration to address climate change.

Skeptics believe that this is just the latest action by the Administration to keep from having to address climate change. My hope is that time will prove they are wrong, but time will prove whether they are right or wrong. Our country is the world's largest emitter of greenhouse gases. We know that. We account for something like 20 percent of the world's manmade greenhouse gases. We also account for about one quarter of the world's economic output. I believe that we have a responsibility to reduce our CO_2 emissions and, to sort of paraphrase a friend of mine who is testifying today, to slow the growth of those emissions, to stop the growth of those emissions, and then to reduce those emissions.

Unfortunately, to date our country has not demonstrated, at least in my view, the leadership on the Federal level that we need to demonstrate, and my hope is that we will begin to do that.

Luckily, though, some others have filled the void. One of those is Tony Blair, the Prime Minister of England at least for another year. Among the others are elected Governors from East Coast to West Coast, not all of them, but a bunch of Governors, Democrat and Republican. One of them is the fellow out in California, Governor Schwarzenegger. One of the things that he said as he has looked at this issue is, this is his quote, "The debate is over. We know the science. We see the threat and we know the time for action is now."

Governor Schwarzenegger has decided to be, along with a number of our other Governors and colleagues, to be a leader and to back up his statement not with words, but with real action. Last month, California passed, as we know, something they call the Global Warming Solutions Act, which will require Californians to reduce their emissions from today's level to 2000 level by 2010, and

I think by the year 2020, to reduce their emissions down to what they were in 1990.

Additionally, some seven Northeastern and Mid-Atlantic States are moving forward with their own regional greenhouse gas initiative to reduce carbon dioxide emissions in their region.

Now that others have chosen to lead, I am hopeful that our Administration will at least choose to follow, and then eventually to lead. I am glad the Administration has acknowledged the reality of climate change. I am glad that they have acknowledged that it is being caused by manmade emissions, in large part. I think it is now time to acknowledge that it is going to take mandatory action to address the issue.

I believe we can do that at the same time without ruining our economy, and frankly without wreaking havoc on consumers as well. I agree that the development and deployment of new technologies are important parts of any carbon reduction strategy, but without a mandate I am afraid, without a target, what is going to drive the technology? By last year, there were a handful of ethanol and biodiesel plants in the country and they were mainly located in the Midwest. After passing a renewable fuels mandate, though, we have seen investment in ethanol and biodiesel refineries across the country. In fact, we have just opened one just north of Dover in our State, where we take soybean oil and turn it into biodiesel fuel.

We see a significant increase in research of new renewable fuels such as holistic ethanol and bio-butanol. The same holds true for clean coal and other climate-friendly technologies. Today, we are seeing a handful of IGCC plants being built in the United States. But without a mandate for the level of deployment necessary, I am afraid it will never be achieved.

So I am anxious to hear today what actions the Administration plans to take to not only encourage deployment of new technologies in other countries, but what they are going to do, really what you are going to do, to aid the deployment of those technologies right here at home, right here in America.

Thanks, Mr. Chairman.

Senator INHOFE. Thank you, Senator Carper.

Senator Bond.

OPENING STATEMENT OF HON. CHRISTOPHER S. BOND, U.S. SENATOR FROM THE STATE OF MISSOURI

Senator BOND. Thank you, Mr. Chairman. I have been looking forward to this hearing today on the Asia Pacific Partnership. I think the APP represents a very workable vision for the future. We know that any successful global warming strategy must include China and India. One of the reasons that the Kyoto Protocol was doomed to failure was because it didn't include India and China. The Senate recognized that when almost 10 years ago we voted not to accept it, 97 to nothing. Obviously, the very real and very important second reason was the cost of mandatory controls was so burdensome. It wasn't just going to be costs to corporations that everybody likes to think we can stick with the costs of global warming. The costs would be to the people who are served by and employed by corporations.

The alternative is services and goods that would not be produced. So until we develop the technology, until we develop better abilities to control it, which we obviously should work on, I don't see us, I certainly hope we don't change our view. We know that Chinese industrialization will add over 100 new coal-fired powerplants over the next few years. China soon will surpass the United States in carbon dioxide output. I was in India this spring, and India is right behind China in using industrialization to lift hundreds of millions of poor out of their misery.

What they are trying to do is one of the visions of the future for APP, and that is to bring technology to the benefit of China and India and others. I talked with the leaders of India when I was there, about the potential for things like coal gasification, which they have large coal resources. If we can help them with their energy problems, their pollution problems, and their employment problems by assisting them in setting up coal gasification and liquefaction, that makes a tremendous amount of sense. We should be doing that.

China and India, and many nations across the Third World, need industrialization to improve the lives of their people. They use industry to bring electricity, clean water, transportation, communications to families who have only known hardship. But current technologies mean each one of those poverty-ending advances produce carbon dioxide. We can't tell them to halt their efforts and reverse their efforts. They are not going to cap their industrial outputs until we can provide the technology that will allow them to cap the outputs without depriving their people of the benefits they seek.

Western environmental moralism won't feed billions. Precautionary principles won't electrify villages. GYA will provide no jobs for the teeming masses of the Third World poor. Just as we will not impoverish segments of our own society through job-killing energy cost-exploding plans, we can hardly expect India and China to prolong their own impoverishment in the name of global warming.

Only affordable technologies that allow new growth, new jobs, new life will be accepted by the East. Indeed, only affordable technologies will be accepted by America and Australia. Global warming solutions that call for the immediate restructuring of industrial economies are fantasy. They are impossible. Calls to replace payroll taxes with pollution taxes are fantasy. No better advocates of affordability rely upon the assumption of $1 natural gas or quadruple the LNG imports, especially when those advocates themselves block new LNG ports for receiving LNG.

So with its Asian partners and its development of new affordable technologies, APP may not provide the solution to global warming fears, but it provides a direction and a sound basis to proceed. I look forward to the testimony of you, Mr. Chairman, and I was proud to support funding for APP and look forward to its success. I thank you for your leadership.

Senator INHOFE. Thank you, Senator Bond.

Senator Lautenberg.

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

Senator LAUTENBERG. Thanks, Mr. Chairman. I understand I missed an opportunity to hear some views dealing with our environmental problems, and that in fact it kind of in some ways was dismissed as being a ruse or even a hoax. Mr. Chairman, with all due respect to my colleagues and you here as the Chairman, the fact of the matter is that the evidence is pretty damning around us that things are changing in a not positive way.

I am happy that we are here to discuss the Asia Pacific Partnership and the idea of partnership always has merit. But I think we have to decide whether we are going to lead this chase for a cleaner environment and to reduce the climate changes that are ominous in their condition, or whether we are going to find reasons why we don't because others won't, which I think is a bad idea.

Today should be a day of action on climate change, and perhaps the most serious environmental threat our Nation and our world faces. But it is not happening. As the weeks and the months pass, a steady stream of reports from scientists continue to document the current and potential impacts of climate change, including loss of Arctic Sea ice. I have been to Antarctica. I have been to the South Pole. I went to visit with the National Science Foundation and found the alarm down there that they were registering because of the loss of sea ice there.

We note the retreat of glaciers and record temperatures. What does it take, for God's sake, to understand that there is something afoot here? Well, while do we do nothing about it in this Congress, others are acting. California, and we are joined here by our colleague who is I am sure going to say something about what has happened there, has passed legislation to cut carbon dioxide emissions 25 percent by 2020.

Seven Northeastern and Mid-Atlantic States, including my State of New Jersey, participate in the Regional Greenhouse Gas Initiative, which aims to reduce carbon dioxide emissions from powerplants by 10 percent by the year 2020. Nearly 200 Mayors who represent almost 50 million people have signed the U.S. Mayors Climate Protection Agreement. Are they also part of a hoax? This is going to help them meet the Kyoto targets in their own cities.

On this issue of climate change, we need to get on with it. Scientists want it. The people want it. I hear in fact that places like India and China are going to just throw more pollution up and affect the climate. Well, I don't know if that is going to save us, so therefore if it is going to happen anyway, why don't we do our part in creating an unsuitable climatic condition?

Instead of the leadership that I think we ought to have in this country, I fear that Congress will only follow on, follow the oil industry, the automobile industry. Don't ask anything of these people. Ask nothing of them, and provide a little incentive here or there. But when we compare the loss of the business opportunity to the loss of health and well being for future generations, including my grandchildren and everybody else's grandchildren, it makes me wonder about what we are doing here with our time.

So I hope that we will all think of those who succeed us, our children, grandchildren. And this committee and this Congress will

give them a world that is cleaner and better, and not in decline. Mr. Chairman, I worry about the economy. I was in business. I ran a big company before I came here. I know what it is like to create a job, pay the expenses that come along with that, and the difficulties in obtaining market entrance. But for goodness sake, when I look at what happens in terms of family health and well being, and suddenly finding that we are sweating all over the place and things are changing and we see fish down here in the Potomac River, male fish carrying female eggs, it tells us that there is something wrong out there, everybody, and we ought to get on with doing something about it.

Senator INHOFE. Thank you, Senator Lautenberg.

[The prepared statement of Senator Lautenberg follows:]

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

Mr. Chairman, we're missing an opportunity today. We are scheduled to discuss the Asia Pacific Partnership. The idea of the Partnership has merit. But I am concerned that today's hearing is merely a diversion. Today should be a day of action on climate change—perhaps the most serious environmental threat our Nation—and our world—faces. But it's not. As the weeks and months pass, a steady stream of reports from scientists continues to document the current and potential impacts of climate change, including loss of Arctic sea ice, retreat of glaciers and record temperatures.

While we do nothing about this problem in Congress, others are acting: California has passed legislation to cut carbon dioxide emissions 25 percent by 2020. Seven Northeastern and Mid-Atlantic states including New Jersey participate in the Regional Greenhouse Gas Initiative which aims to reduce carbon dioxide emissions from powerplants by 10 percent by 2020. Nearly 300 mayors who represent almost 50 million people have signed the U.S. Mayors Climate Protection Agreement, which will help them meet Kyoto targets in their own cities.

On this issue of climate change, we need action. Scientists want it. And the people want it. Instead of leading, I fear Congress will only follow—follow the oil industry, the auto industry and other opponents of real action, down a path of environmental destruction. When I think about the environment, I think of my grandchildren, and my desire to leave them a cleaner, safer, healthier world. I hope we all will think of our own children and grandchildren. And I hope this committee and this Congress will give them a world that is on the rise, not in decline. Thank you Mr. Chairman.

SENATOR INHOFE. Senator Boxer.

OPENING STATEMENT OF HON. BARBARA BOXER, U.S. SENATOR FROM THE STATE OF CALIFORNIA

Senator BOXER. Mr. Chairman, thank you very much for holding this hearing. Every day we learn more about the potentially catastrophic effects of climate change. We know the National Academies of Science for 11 nations, including the United States, Great Britain, and France, have stated that "there is strong evidence that global warming is occurring; that most of the warming in recent decades can be attributed to human activities, and that nations are justified in taking prompt action to address climate change."

NASA's lead climate scientist, Dr. Jim Hansen, has said we may be approaching a tipping point beyond which we can no longer avoid long-term changes that could constitute practically a different planet.

Climate change could trigger a devastating rise in sea level, increase the spread of infectious disease, harm agriculture. In California, climate change could dramatically reduce the Sierra Nevada

snowpack, decreasing our State's precious water supply. It could also increase our already serious air pollution problems, hurt our wine industry, and dramatically increase extreme heat waves that Senator Lautenberg talked about.

The United States is the world's largest greenhouse gas emitter. We have a responsibility to act now by setting mandatory targets to reduce greenhouse gas emissions. The California legislature recently enacted AB 32. It sets a target of reducing greenhouse gas emissions to 1990 levels by 2020, a 25 percent reduction. Senator Jeffords, bless his heart, S. 3698, the Global Warming Pollution Reduction Act, shares the same goals as AB 32.

These bills are responsible. They will lead our country in the right direction. They address a serious problem. But unfortunately, we don't see enough action here. You and I got into it the other day about this issue. I was hopeful we could come together. I am still hopeful we can come together. Today's hearing is a good start, but I want to make a point that here we have a situation with this agreement where there really are no real goals. There is nothing mandatory about it, and it is just not going to save us or help us, or resolve the problem.

I would ask unanimous consent to place into the record two letters from my religious communities in California and religious communities all over the country, Mr. Chairman. May I do that? They are not long.

Senator INHOFE. Without objection. And at the same time immediately following that, I ask unanimous consent that I enter into the record the four-page letter from the Interfaith Stewardship Alliance, which is approximately 200 it looks like groups, with opposing views.

Without objection, so ordered.

[The referenced documents follow on page 156.]

Senator BOXER. Well, of course. And I would ask that I be given the minute it took you to say that, because I am running out of time.

Senator INHOFE. I object.

Senator BOXER. You object?

[Laughter.]

Senator INHOFE. No, I don't. Go ahead.

Senator BOXER. Thanks.

A Time For Bold and Immediate Action on Global Warming, an urgent appeal from religious leaders for mandatory limits on greenhouse gases is extraordinary. This is from every single religion you can think of is in this. They say we are clergy. We are religious leaders of many faith traditions from across the country. We are watching with alarm as the pace of climate change quickens, and our leaders do nothing in Washington.

Concrete measures must be put in place. We appeal to you, they write, from a position of faith. Every major religious tradition calls on us to be stewards of creation. We have a responsibility, moral, to protect the Earth for our children and future generations. As religious leaders, we recommit ourselves today to do our part.

On and on it goes, and I don't want to take up too much more time. That is the first letter. The second is from the Episcopal Church, the Evangelical Lutheran Church in America, Friends

Committee on National Legislation, Maryknoll Office of Global Concern, Mennonite Central Committee, National Council of Churches of Christ, United Methodist General Board of Church and Society, Union of Reformed Judaism. This is the second letter.

God has called each of us to protect the poor, the voiceless, and creation itself. Our faith traditions and denominational policies make clear that this call is a mandate requiring action.

So, I am excited about this. I think the people are waking up to this, and they are way ahead of us. You know, I am sure they are pleased that we have this agreement that is going on. It is better than nothing, but at the end of the day, nothing could happen. Essentially the goal is so weak it doesn't move us forward. It doesn't take us where we have to go.

So thank you for this hearing. I am very happy you are doing it, but we have more work to do.

Senator INHOFE. Thank you, Senator Boxer.

As we announced earlier, because of the changes, first of all, we changed it from 2:30 today to tomorrow, then back to today at 4 o'clock. We will dispense with any further opening statements of members who are not here right now.

At this time, we will recognize Jim Connaughton.

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

Mr. CONNAUGHTON. Thank you, Mr. Chairman and members of the committee. It is a pleasure to be here today to testify about the Asia Pacific Partnership on Clean Development and Climate.

I think to put this in its context, this is the heart of the portfolio strategies in which we are all interested. It is not the solution all standing alone, but I would submit that it is a very consequential one and hopefully it is one, notwithstanding differences of opinion on some of these issues else-wise, this is one I hope we can all agree on. It is a very important tool in the broader tool kit we need to address a basket of issues.

The partnership was launched in January 2006 by President Bush and the leaders of Australia, China, India, Japan and South Korea. This initiative establishes an innovative public-private collaboration for addressing what the world leaders now agree are interconnected challenges of assuring economic growth and development, eradicating poverty, addressing energy security, reducing pollution, and mitigating climate change.

We can't work on one without considering the other. They come together. The partnership's six members are consequential because they represent about half of the world's economy, population and energy use now and into the future. Together, they produce about 65 percent of the world's coal, 61 percent of its cement, 40 percent of its net electricity generation, 48 percent of its steel, and 35 percent of its aluminum.

The partner countries are also responsible for significant amounts of air pollution, and around 50 percent of the world's carbon dioxide emissions from fossil fuels. The partnership is working initially in eight major sectors that matter to these issues in order to share technologies and practices, open up markets, and reduce barriers to markets, significantly increase the profitable investment

in the best of today's technologies, and accelerate the development and use of promising new ones.

The initial areas of focus are straightforward: No. 1, cleaner and lower carbon emission fossil power technology; No. 2, renewable and distributed energy systems; No. 3, power generation and transmission efficiency; No. 4, steel; No. 5, aluminum; No. 6, cement; No. 7, coal mining; and No. 8, very importantly, buildings and appliances.

Mr. Chairman, I would like to thank you and members of this committee and the Senate for your broad bipartisan support for the Asia Pacific Partnership. The partnership is a key means of implementing the strong bipartisan Senate amendment that became Title XVI of the Energy Policy Act of 2005. The partnership is also consistent with the clean energy technology exports initiative that was discussed in the fiscal year 2001 Senate Energy and Water Development Appropriations bill.

Many aspects of the CETA initiative are now found in the Energy Policy Act of 2005 and are being implemented through the partnership.

The partnership is a team effort. To that end, it requires a team budget to administer. Reflecting the philosophy of the partnership in taking an integrated approach to these challenges, funding its implementation is necessarily spread over four agencies. We need the help of the Department of State, the Department of Energy, the Environmental Protection Agency, and the Department of Commerce.

I look forward to using this opportunity today to discuss the benefits of the partnership and the urgent need for Congress to support the President's $52 million budget request, which we expect will help leverage billions of dollars in both public and private investment in a more secure, more efficient, cleaner and lower greenhouse gas energy future.

A few aspects of the partnership, just to give you a flavor that I hope will inspire some good questions. We are placing a strong emphasis on identifying opportunities for what I call mass producible outcomes that are using tried and true technologies and practices. So rather than the more conventional approach of taking a large sum of taxpayer money and building one project, we want to use the power of the networks we will create among the private sector partners, the government officials, as well as the financiers, to leverage some of these market-opening opportunities.

Let me give you one example, and I have dozens more, but let me give you one. Recently China entered into agreement with Caterpillar to purchase $58 million of methane capture equipment for use at China's largest coal mine. Now, why is that an important agreement? Well, methane gases are released into the atmosphere from mining operations. It is the gas that actually kills miners when it is not managed appropriately. It is a very strong contributor to ozone, and it is also a greenhouse gas that is 20 times more potent than CO_2.

As it happens, when you capture it, you can convert it into a clean-burning energy source at a profit. It is just that we don't do it very much. We know we can do it. It is just not done very much. What we have been able to do in America through a program that

the EPA has been implementing is install methane capture equipment on 20 what we call gassy coal mines. As a result, we are improving mine safety, cutting an air pollutant, cutting a greenhouse gas, and delivering a clean energy source.

Well, this same philosophy we are taking to the international sphere. So with this new deal between China's largest coal company and Caterpillar, they are going to produce 120 megawatts of power from the mine. This is methane that otherwise would have gone into the atmosphere. This will save the carbon equivalent of about 4.5 million tons of carbon dioxide. To put that in perspective, the Kyoto Protocol would seek to achieve about a 500 million-ton reduction. So just with one $58 million deal, we will get 1 percent of what the Kyoto is expecting to achieve at a profit in a way that contribute to economic growth and human development.

Now, the potential for doing more of this in America is quite strong. We have several dozen more, maybe more than that, in America. In China, there are perhaps 100 opportunities to replicate the same kind of arrangement. Once we do it right once, we can do it again and again and again. So that just gives you one flavor of what we are trying to achieve. My testimony lists a number of additional examples.

I look forward to talking to you about this because again, notwithstanding differences in the climate sphere, the development sphere, what is happening on air pollution, this is the core of something we can all work together on and achieve real results.

Thank you very much.

Senator INHOFE. Thank you very much, Mr. Connaughton.

I am going to give you the opportunity to go ahead and expand a little bit on that. The Caterpillar story is fascinating, and you said the potential for others are very good, but you didn't have time. Do you want to take a little time and talk about some of the potential that other companies or other industries out there have?

Mr. CONNAUGHTON. Sure. Let me look to aluminum. In America, the aluminum sector has initiated a very aggressive program on eliminating what are called PFCs, perfluorocarbons. These are substances that actually are a thousand times more potent than CO_2 in contributing to the greenhouse gas effect. Our domestic sector, in a partnership with EPA over the last several years, has made a commitment to reduce, and they are on their way to eliminating PFCs in aluminum manufacturing.

As it happens, having made the commitment, they figured out that it is a money-saver. It is one of those until you go looking, you don't find, and it is a money-saver. Now, with that experience, we can take that to each of the other partner countries. China, currently their aluminum production is going through the roof. The same is true, there is an expanding aluminum sector in India.

This is an opportunity as they invest in their new facilities, and as they try to make the old ones more efficient, we can take those skills, the financing arrangements, take them into those marketplaces and try to get many more deals cut to make that same result.

Senator INHOFE. That is good, Mr. Connaughton. That is a good example.

Now, in the written testimony that was submitted by Mr. Lomborg, who is going to be on the next panel, suggests every nation committing 0.05 percent of GDP on research and development of non-emitting technologies. I would like to ask you, what is the United States already spending and how does it compare to the amount being spent by other countries?

Mr. CONNAUGHTON. In climate science and technology, our budget is in the vicinity of $5 billion to $6 billion a year.

Senator INHOFE. Now, how does that equate, then, to other countries?

Mr. CONNAUGHTON. We spend more on climate science and technology than any other country, more than many of them combined. I don't have the precise figure on the world total.

Senator INHOFE. All right. I had heard that it was more than all other countries combined, but that is a good enough answer.

In your testimony, you talk about leveraged outcomes with the governments doing what they do best and the private sector doing what it does best. To me, leveraging means getting a lot more bang for the buck. Is that accurate? And what exactly would be the result of leveraging? And how does this differ from financial aid programs?

Mr. CONNAUGHTON. Leveraging is trying to use the offices of the government to connect people with technologies, practices, financing arrangements, and then also using the power of government to remove barriers. So for example, each of the Asia Pacific countries currently imposes tariffs on each other in terms of energy efficiency equipment and environmental technologies, goods and services. That is senseless. They impose about the same level of tariff on each other. If we remove those tariffs, we would be able to increase and open market access to those technologies. By the way, California is one of the world's leaders in these technologies. We would be able to open up billions of dollars worth of access into these markets that is currently precluded just because of a tariff barrier. We are trying to move beyond that.

So there is an example of leveraging. The other one is there are still many ways to reduce air pollution, improve energy efficiency and cut greenhouse gases at a significant profit. The more we can bring education to those opportunities, those opportunities are replicable fast. It is only when we want to try to impose a net cost that people begin to get skittish.

So one of the avenues of leverage is to show to India some of the most efficient practices we have been able to enjoy here in America, for example, in coal power generation. And then apply that as India begins to reinvest in this infrastructure.

Senator INHOFE. Mr. Connaughton, I think it was Senator Bond who said in his opening statement, he talked about what was passed unanimously 96 to nothing here in terms, it was worded this way, we would not accept anything that developing countries would have to share the responsibility with developed countries.

Now, do you have anything since that that would give you reasonably that China and India are ready to accept carbon targets?

Mr. CONNAUGHTON. There is no question that China and India are not ready to accept carbon targets. I think the G–8 leaders at the Gleneagles Summit, where President Bush worked coopera-

tively with Tony Blair. You know, they recognized that countries like China and India have some very fundamental priorities, because they were our priorities not too long ago. Energy security is paramount and access to affordable energy.

Currently in China, their air pollution is at a higher level today than America was at its height, and China only has one sixth of America's economy. So they have very real challenges that are right in front of them. Now, as it happens, we can work with them on those high domestic priorities, and add the greenhouse gas mitigation piece to that conversation, and they are very welcoming of it.

But I also indicate they, like us, are not shy of mandates where they are appropriate. Their new 5 year plan actually mandates a reduction in air pollution of 10 percent, and then when it comes to efficiency, and then the related benefits of greenhouse gases, they are pursuing an approach similar to ours. It is an efficiency goal based, calibrated to their economic growth, but it is a strong goal. It is a 20 percent efficiency objective by 2010. That is a big step for them for the first time.

Senator INHOFE. All right. Thank you, Mr. Connaughton. My time has expired. We are going to try to adhere to our time limitations due to the late hour starting this.

I do have a letter from the Republic of Korea's Ambassador to the United States stating support for the Asia Pacific Partnership. Without objection, that will be made a part of the record.

[The referenced document was not available at time of print.]

Senator INHOFE. Senator Jeffords.

Senator JEFFORDS. Mr. Connaughton, in 1990, Congress enacted the Global Change Research Act. Under that act, the climate change science program is to prepare every 4 years a comprehensive scientific assessment of its national global change research, commonly called the national assessment. The Administration missed its 2004 deadline and the GAO has found that the Administration attempt to substitute 21 smaller reports does not meet the requirements of the law. When will we see the new national assessment that meets the requirements of the law?

Mr. CONNAUGHTON. The 21 assessment products you referred to, Senator, are the combined work by which we will not only meet the requirements of the law, but we are actually engaging in a number of activities that go beyond that. That was the product of a massive international collaboration among scientists as we set out our 10 year climate research plan so we could begin to organize the priorities better and were consistent with the advice we obtained from the National Academy of Sciences.

So it is our expectation that by coming up with, and the scientists gave a very strong indication of the key synthesis and assessment products we needed. We are now going to do those, but we will do those in real time, and the schedule we have is actually on a 4-year schedule to product that series of documents.

So we look forward to sharing that with you, walking you through how that lines up with the requirements of the 1990 act. We hope that you will be as eager as we are for these products, the first one of which was the temperature change report which was an outstanding piece of work. I would commend it to you if you

haven't read it yet, that helped us understand. We have narrowed some of the uncertainties on temperature trends, and that was a very important document to get out. It is good to get it out now, rather than wait for 4 years. It was ready. A few others will take a little bit more time, but we will get them out in as timely a fashion as we can.

Senator JEFFORDS. I sent you a letter earlier this month asking questions about the Asia Pacific Partnership and other climate change issues. I understand you have promised staff that you would come prepared to answer the questions posed in that letter here. One question that I asked of you, and that I will repeat now, is: How much of the $52 million budgeted by the Administration for the partnership will be spent on actual technology transfer?

Mr. CONNAUGHTON. First, let me say I did get a chance to read all the questions yesterday in preparing for this session, so I appreciate them. Actually, they indicate a lot of very good thought by your staffs, who are really capturing the various dimensions of the partnership. I look forward to providing you written responses to all the questions.

On that particular question, actually, I guess the bulk of it is going to be spent on sharing technologies and practices and diffusion of technology. For example, there are Energy Department experts working with some of the experts from the utility sector that are going to be able to go into a session with their counterparts in China, India and Japan and actually put on the table the various technologies they are now evaluating for use and installation at their own facilities. It is through that kind of an exchange that we are going to actually broaden the market understanding of some of these efficiency opportunities.

What it will not be doing is this is not like an aid program. So we are not going to take $5 million out of the $52 million and build a project someplace. The goal is each country is setting national objectives, and the goal is how do we use this money to leverage the awareness of the best opportunities for efficiency gains, pollution reductions and greenhouse gas reductions. So that is how this will be used.

It is very different than, for example, building the $1 billion FutureGen plant. By the way, China, India, and South Korea are contributing tens of millions of dollars to that effort. So actually we are getting money into the partnership from our partners. It is not a question of our giving money to them.

Senator JEFFORDS. Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Jeffords.

Senator Murkowski.

Senator MURKOWSKI. Thank you.

Mr. Connaughton, following up on Senator Jeffords' question about the $52 million proposed by the President, I understand in looking at your testimony here that the government of Australia is going to contribute about $75 million to the partnership over 5 years, and you state that discussions are underway regarding financial support from other partners. What is the current situation, then, with say South Korea and Japan in terms of funding participation?

Mr. CONNAUGHTON. Actually, I think the figure for Australia is $100 million, unless they started to pull back on it. So that is $20 million a year. We have been able to already identify some of the areas of work we are ready to commit to these networking arrangements we talked about. Japan has a different structure for how they deal with financing. A lot of this work is going to occur through their JBED, their Japan Investment Corporation that does a lot of this kind of work, this technology transfer work.

And so exactly how they structure it is what they are working on. The task forces have just submitted their work plans that are going to be consolidated and reviewed in a month in Seoul. Once those work plans are in place, I think we will get a clearer indication of the level of investment that will be coming from each of the other countries. Australia and the United States thought it was important that we front-load the conversation to show what we wanted to achieve. The other partners I think, when we agree on a work plan, the partners are agreeing to fund the work, and so we will be able to give you a better sense of that after the work plans are approved.

Senator MURKOWSKI. So the fact that we don't have dollars identified or an amount of funding identified from these countries doesn't indicate any lack of commitment to the partnership in proceeding?

Mr. CONNAUGHTON. No. In fact, I would note to the contrary that if commitment is measured in rank, the level of rank of official that is spending time on these meetings, pushing the public-private conversations, is unprecedented in my experience in government. I met with the Vice Premier of China. I was just meeting with the head of the National Development Reform Commission. These are individuals who typically do not participate in the climate change discussions. These are individuals who typically are not out working one on one with EPA on air pollution programs.

So I think if you want the best indicator of commitment, it is that indicator. It is the high-level engagement of the highest levels of these governments.

Senator MURKOWSKI. That is good to hear. You keep using the term "leveraging" and how we are going to leverage the government dollars; how we are going to just leverage this partnership and the relationship. I have been visited by some constituents, several in just this past week that we have been back, each one of them looking for whatever money they can find for their renewable energy projects. A couple of them are in geothermal. One of them is wind, but certainly things that we want to be supporting as we look to finding some alternatives.

Our reality is that the dollars are just tough to find when we are looking to bring on this new technology, particularly when the projects are smaller projects. You just don't have the economies of scale. We were talking about how we build a level of interest so that we get more private financing dollars to the technology that we are going to need to really make a difference, whether it is in addressing the issues in Alaska or whether it is addressing the issues that you all are faced with in the partnership.

I know that after the Energy Act of 2005, we had a great deal of interest with private dollars looking to invest in ethanol ven-

tures. How do we get that same level of excitement and enthusiasm in some of this other technology that we have to get moving forward? How do we leverage that? How do we find it?

Mr. CONNAUGHTON. Two aspects of that. One is on the large-scale research is a leveraging question among governments. FutureGen is the best example of that. Now, it is about a $1 billion research effort. It is a big, complicated project to try to figure out how to get zero-emission coal. We leveraged that because there is a private side to it for, I forget, I think it is half-and-half. There is a private side and a government side.

What we are getting is a number of governments are contributing to the government pot, and then the private sector entities. So for example, our major utilities are all contributing significant portions, plus our technology vendors, to the base-build for this plant. China, one of their largest utilities, the Wanan Group, has just committed to join the private sector side of this discussion, and I think South Korea has as well.

They will then share in the intellectual property that is generated by this project. So whoever puts money in will share the benefits of the technologies coming out. That is very powerful, because now they have an incentive because they will actually own the economics of success. So that is how we deal with the research side.

On the non-research side, it has been exciting for me, and I know it has been exciting for all the members on this panel, because I see reports out of all of your States. The level of private sector capitalization toward green technologies is growing at an exponential rate, whether it is Goldman Sachs' $3 billion fund; the Carlyle Group is raising a major fund. The amount of money being raised in green energy now is accelerating at the rate we saw on IT back in the 1990's.

So there is a lot of capital now looking for the highest yield outcomes. We can introduce those sectors through the partnership and other mechanisms to, again, a vast pool of investment opportunity, not the least of which is something like methane. Even more simply, we are trying to create new policy design here, and with our partner countries, so the private sector itself will invest on its own in energy efficiency.

So for example, at Federal facilities, we have an energy management plan where under new authority from Congress, the private sector will pay to install efficiency equipment at government facilities. We will share the savings with the investors, so the taxpayer saves money and then the private sector people make a reasonable rate of return, and we never have to get an appropriation.

Senator INHOFE. Thank you, Mr. Connaughton.

Thank you, Senator Murkowski.

Senator Lautenberg.

Senator LAUTENBERG. Mr. Chairman, thank you.

Senator INHOFE. Excuse me. I am sorry.

Senator Carper? I apologize. Senator Carper.

Senator LAUTENBERG. I thought I had gotten a promotion.

[Laughter.]

Senator CARPER. Thanks, Mr. Chairman.

Mr. Connaughton, I am going to ask you to respond to my questions briefly, if you would. One of the goals of the partnership you have been describing, as I understand it, is to encourage the use of higher energy-efficient appliances. This year, as you know, the Department of Energy's SEER 13 standard for air conditioners went into effect. The SEER 13 standard will alleviate, I am told, the need for building maybe as many 50 fewer powerplants by the year 2020 in this country. For reasons I don't understand, the Bush administration actually tried to weaken that standard, and instead of having a SEER 13, to have a SEER 10 standard. Fortunately, the courts went the other way and the Administration decided not to fight the court ruling.

Let me just ask, what kind of efficiency goals for appliances is the Administration trying to develop within the Asia Pacific Partnership? Again, I would ask you to be brief.

Mr. CONNAUGHTON. On the energy efficiency standards, actually we are pleased to push for the legislative standards that were set in EPAC 2005, and we are moving forward with the schedule to implement all of those. So to the extent there were issues around the SEER standard, those have been overtaken by legislation, and we are strongly pushing to achieve those. The one issue that always comes into play as it applies to efficiency standards is——

Senator CARPER. My question, OK. My question was, what kind of efficiency goals for appliances are you trying to develop within the Asia Pacific Partnership? That is my question.

Mr. CONNAUGHTON. We will then be sharing each of our countries' current portfolio of energy efficiency standards and seeing what we can do to, again, get all of this to a new place on those. At the same time, we are pushing to make the Energy Star program, which is energy efficiency labeling, we are trying to make that international. That program alone has been responsible in 2005 for 35 million metric tons of carbon-equivalent reductions. That is savings of a pretty big sum. We think it will be $12 billion that would double in 10 years. So these are great opportunities, strongly support them.

Senator CARPER. OK, good. And now, to give you a chance to answer the question you started to answer, I think, and that is now that the Administration appears to realize the kind of benefits of energy efficiency and is pushing for those higher standards that you just alluded to for some other countries, what kind of new efficiency standards can we look for within our own country and the kind of appliances? You were just starting to say that, and I will ask you to go ahead and address that. Again, briefly.

Mr. CONNAUGHTON. The Department of Energy has a schedule for that. Some were set by statute for the numbers pick. Others were set for them to develop. The piece I wanted to highlight that is important to understand is in some of these areas, you can pick the most efficient, but if it is a lot more costly, then nobody buys it and therefore you don't get the efficiency and environmental outcome you are looking for. Often it is the second-best that has the broadest uptake. So when we do the math on this, we are trying to produce the biggest efficiency outcome in terms of real purchases, rather than theoretical purchases.

It is like computers. You sell a lot of the second-best computer because the leading one is really expensive. And that is what happens. Efficiency standards then go up on that kind of a ladder. So that is at the heart of the disagreement over whether it is 15 or 14. It has to do with what will get the broadest purchase.

Senator CARPER. OK, thanks. Thanks very much. As an aside to my colleagues, we bought our house about 20 years ago and did a lot of work on it. One of the things we did was we bought a new air conditioning unit for our central air. Earlier this year we replaced it. We replaced it with a SEER 18. I got my electric bill last month, this is for the months of July and August. It was $157, roughly half of what the electricity bill had been in the summer before.

I think before we had like maybe a SEER 8 or SEER 10 from 20 years ago, but it was really remarkable the kind of reduction we have seen in our electric bill.

My third question, Mr. Connaughton, is, I understand today CBO has stated that they believe that technology development needs to be done alongside a carbon cap. I just learned this, and that may be breaking news to you. Last year, the EPA concluded in response to our request that they model the Administration's proposal, the Jeffords proposal and our bipartisan proposal, and the EPA concluded a carbon cap like the one that was offered in the legislation that you and I have discussed, would cost basically about $1 per ton, and it would not cause a significant surge in electricity costs.

I just wanted to ask here today if you had a chance to look at that, and if so, if you agree with the EPA's conclusions with regard to $1 a ton for carbon. You may recall, a lot of that is out of sector and would look to reductions through a lot of our agriculture sector as well.

Mr. CONNAUGHTON. I have not seen that report. I just saw a very short news item on it.

Senator CARPER. It is a good one. It is one worth reading.

Mr. CONNAUGHTON. As I underlined first and foremost, there is a lot of CO_2 reductions that can come at a profit. So a lot of this talk about cost-per-ton, there is a lot that can come at a profit. The policy design is what matters. As ever with the carbon mandate, one of the core questions is are you overheating the mandate such that you are merely moving the pollution to another location. So you have to calibrate against that.

The other one is the issue of design that is based on offsets and an assumption of a lot of offsets. By the way, offsets are good in terms of carbon reduction. Offsets are bad in terms of technology development. For example, when we did the SO_2 program, we didn't do offsets because we wanted to advance SO_2 capture and control technology. So SO_2 is limited to the sector.

If you then allow for offsets, it is always going to be cheaper to go do it someplace else and not advance the technology. So it is all in policy design. I have to confess I am not fully up to date on all the aspects of where your bill currently resides, but it is an important part of the ongoing conversation. I think the work that Senator Domenici did, which had to do with variance on what you were doing. I think there is a lot of good thought into addressing these

unintended consequences, and that is a worthwhile conversation to continue.

Senator CARPER. Thank you.

Thanks, Mr. Chairman.

Senator INHOFE. Thank you, Senator Carper.

Senator Lautenberg.

Senator LAUTENBERG. Thank you very much, Mr. Chairman.

Mr. Connaughton, recent studies have shown the accelerated melting of glaciers. We know that these glaciers in most instances are the reservoir for fresh water to be distributed throughout the atmosphere and irrigation for crops for millions of people. Is this global warming as the Administration sees it a potential threat to national security, as well as a humanitarian crisis?

Mr. CONNAUGHTON. There is no question that the current temperature change projections show a projection upward, so increased surface warming. That potentially has many different effects depending on how much the temperature goes up. So there is a lot of discussion of that.

To the extent there are vulnerabilities such as on shorelines, the most interesting science as I understand it right now is the science on glacier melting. There are good reasons to consider how we deal with community exposure to the rising sea level that are related not just to long-term projections of climate, but the very real threats they face today with typhoons and tsunamis and hurricanes. So there is a lot of work we can do that is clearly justifiable.

Senator LAUTENBERG. Is it a threat to national security, Mr. Connaughton?

Mr. CONNAUGHTON. I wouldn't be equipped to offer a judgment on that.

Senator LAUTENBERG. Really?

Mr. CONNAUGHTON. Yes.

Senator LAUTENBERG. So you don't think a diminution of fresh water stored in Antarctica matters an awful lot in terms of how we conduct life in the future?

Mr. CONNAUGHTON. When you look at the projections of water supply in America and our sources of water, I am not aware of a connection between what is occurring in Antarctica and what is occurring in the States. There are projections of increased drought in some areas of the country with long-term temperature trends and there are also some projections of increased rainfall. So that is what our science program is trying to better understand so we can better plan for those effects.

Senator LAUTENBERG. Yes, OK. We don't have enough time for very long responses.

NOAA studies show that global warming is making our oceans more acidic. A change in the chemistry of our oceans could harm coral and plankton fish and could place a large part of the ocean food chains at risk. Is that something that concerns you and the Administration? Or is that just casual evidence of nothing really important?

Mr. CONNAUGHTON. Yes, it is something that concerns us.

Senator LAUTENBERG. So are there any plans to address this particular threat, to change what we see happening on a regular basis?

Mr. CONNAUGHTON. The first element of addressing that is engaging in the research that the National Academy told us to do is to understand these phenomenon in the oceans, because it is one of the least well-developed areas of research. I know, Senator, you have strongly supported that line. As we gain information from that, we have to pursue management strategies and then it is also one of the reasons that justifies the quite substantial investment being made on the public side and on the private side to slowing the growth of greenhouse gases on its way to stopping it, and then reversing it.

Senator LAUTENBERG. I think I may have asked you this before. There was a study done for the Navy by a contractor on what the Navy's needs might be in the last half of this century, the later half. The one warning about flooding and people trying to get here from lands that are virtually now underwater in many places, including Holland and Bangladesh and across the world, and the Navy is trying to prepare itself to deal with that kind of a situation, to keep those people seeking higher land off our shores.

So it said something that is really ominous there. We still don't want to resort to mandating changes in emissions and things of that nature, and we are going to wait until science catches up with us. When do we run out of time, Mr. Connaughton? Aren't there long-term threats that are going to impair life as we know it in the not too distant future?

Mr. CONNAUGHTON. The Navy set of studies you are talking about are in the same category of the studies they do on contingency planning for any of the host of risks. They spin out scenarios. They are hypothetical scenarios. It is very important planning, you know, whether it is for tsunamis or for long-term climate change. So it is important work. It is not a scientific outcome. It is scenario planning, a hypothetical discussion. Very important.

In terms of how far how fast, the nations as a whole of the world right now, if you look at the portfolio of their strategies, we are making about the same rate of progress, as I have outlined in my written testimony. So if you leave aside some of the grand commitments and some of the dissension over how far how fast, when you look at what is actually occurring, we are improving our greenhouse gas intensity. Europe is improving its greenhouse gas intensity and China and the rest of Asia are improving their greenhouse gas intensity. And we are doing it about in the same ballpark of speed.

So as a collective judgment, if you look at what actually is happening, we are making good progress. It is reasonably ambitious, but it still assures for continued human welfare, and those are the issues we have to constantly try to balance.

Senator INHOFE. Thank you, Mr. Connaughton.

Senator Boxer.

Senator BOXER. Thanks so much, Mr. Chairman.

Sir, where do you think we ought to be in America by 2020 vis-a-vis what percent reduction are you looking for in greenhouse emissions in America by 2020?

Mr. CONNAUGHTON. We have not set a target for 2020.

Senator BOXER. What about 2050?

Mr. CONNAUGHTON. We have set a target for 2012.

Senator BOXER. Well, what is that?

Mr. CONNAUGHTON. It is an 18 percent improvement in greenhouse gas intensity, and we are currently, and my written testimony outlines it, we are currently on-track to meeting that goal, which I would note is a goal that exceeded what the EIA said we could achieve.

Senator BOXER. I am not asking you. I am just trying to get somewhere here. So for 2012, you want to see an 18 percent reduction in the percent that we are emitting?

Mr. CONNAUGHTON. No. It is an 18 percent improvement in greenhouse gas intensity.

Senator BOXER. I don't know what that means, sir. So you don't have any goal as far as where you want to take it.

Mr. CONNAUGHTON. No, that would be incorrect, Senator.

Senator BOXER. Yes, OK. That is important, because that is why I think——

Mr. CONNAUGHTON. That would be incorrect. That would be incorrect, I was saying, Senator. We have a goal. The President set a national goal.

Senator BOXER. You have goal for 2020 as to where we would be in 2020, because, for example, in California and in our bill here, we are saying we want to see a 25 percent reduction and get us back to 1990 levels. What level do you think we ought to be at by 2020? You don't have a goal.

Mr. CONNAUGHTON. Senator, when we set our goal in 2002——

Senator BOXER. Do you have a goal for 2020 as to how much you want to cut? If you want to be back to 1990 levels, 1994 levels, you don't have a goal. And you don't have a goal for 2050. Now, you have a lot of tools in your tool chest, quoting you. We have a lot of tools in our tool chest. What are your best tools in your tool chest?

Mr. CONNAUGHTON. Actually, as all the leaders of the world has recognized, Senator, there is no silver bullet in making meaningful progress on greenhouse gases, nor on energy security nor on pollution.

Senator BOXER. You said, I have a lot of tools in my tool chest. I am asking you, what is your biggest tool in your tool chest.

Mr. CONNAUGHTON. I will give you a few.

Senator BOXER. Good.

Mr. CONNAUGHTON. The $11.5 billion in tax credits and incentives in EPAC for 2005 that you did not support in voting against that bill, that is a huge opportunity. A billion of that will go to the purchase of highly fuel-efficient vehicles. Several billion will go toward cleaner, more efficient energy systems for home use.

Senator BOXER. OK, let me set the record straight. I have led the fight, along with several of my colleagues on both sides of the aisle, for fuel-efficient vehicles and for tax credits for purchase of same. I don't believe in taxpayer dollars being wasted if there is no firm set goal.

Now, decreased intensity can still result in increased total emissions. Is that not fact?

Mr. CONNAUGHTON. As the first step, yes. Around the world, greenhouse gases will continue to increase. The goal is to do so at

a much slower rate. So for example, our economy grew 4.2 percent last year, while greenhouse gases only went up 1.3 percent.

Senator BOXER. So you want to increase greenhouse gases, but at a lower rate of increase.

Mr. CONNAUGHTON. That is the first step.

Senator BOXER. And Senator Jeffords in his great bill is basically saying we want to deal with this and we want to reduce. I just have to say, with your plan, we are headed for a crisis. I mean, you know it is like saying to my children, if they are doing five bad things, do them a little less bad. You can do the five bad things, but do them a little less bad. You are staying up 3 hours after curfew; stay up 2 hours after.

Mr. CONNAUGHTON. Senator, that is the same approach we took with air pollution. We slowed the growth of air pollution first, then we stopped it and then we reversed it.

Senator BOXER. I have a minute. I am sure you are thrilled. Here is the deal. We did send you this letter. You did offer to answer it. We are very grateful. I want to explain why we sent this letter. It was signed by Senator Lautenberg, Senator Lieberman, myself and Senator Jeffords took the lead in getting us to sign it.

We asked a number of questions, one of which is, please detail by actual spending by agency and program what you claim you are spending on climate change, which as you said, $29 billion between 2001 and 2006, and you also indicated 2007, $6.5 billion has been budgeted. Please provide a breakdown of actual spending for fiscal year 2005 for climate change-related activities.

So you are going to get this in writing, sir?

Mr. CONNAUGHTON. Senator, you already have that.

Senator BOXER. Oh, I guess my staff has not received it.

Mr. CONNAUGHTON. It is called Our Changing Planet. It is the annual report to Congress that we have to submit every year with the budget.

Senator BOXER. Well, let me tell you what the GAO said about that, and I don't know whether you know it.

Mr. CONNAUGHTON. On that one, you have the bulk of that information.

Senator BOXER. OK. But the GAO has criticized the way you present the information, that it is very unclear. So what I am saying is we don't want to go through one of your reports. We want you, at our request, to answer us in very clear terms.

Well, Mr. Chairman, I am on the one hand very pleased you are having the hearing because you before were sort of hostile to having any hearings on this. On the other hand, I have to say what I am hearing is very, very, very discouraging. I am a very optimistic person. I look at the problems of the world and I want to fix them.

At the rate you are going, you are not fixing them. You are just talking. But if you are telling me you are so proud you are going to have decreased intensity and then you admit that it can result in higher emissions, we are just going nowhere fast. So I am hopeful we can do better than this.

Thank you.

Senator INHOFE. Thank you, Senator Boxer. Let me correct the record, though, because I have never objected to having hearings.

In fact, ever since the 96 to nothing vote, I have said that I wanted to have hearings on this partnership alliance.

Senator BOXER. OK, let me correct it. That is a fact and I apologize. You have never admitted that there is global warming.

Senator INHOFE. That is exactly right.

Senator BOXER. Yes.

[Laughter.]

Senator INHOFE. I have said that climate is increasing. However, there is a division in the science behind it as to whether or not anthropogenic gases is causing that change.

I thank the panel very much. Jim, thank you for coming down.

We would like to invite our second panel to take their places.

Mr. CONNAUGHTON. Thank you, Mr. Chairman.

Senator INHOFE. Our second panel will be Bjorn Lomborg, Adjunct Professor, Copenhagen Consensus Center, Copenhagen Business School. I would say you are probably a little bit tired right now. Let me say to my second panel that this time has been changed because we understand there was a problem in your getting here, and we appreciate it. You are probably pretty tired now, but you can handle it.

We also have David Doniger, policy director, Climate Center for the Natural Resources Defense Council; and Calvin Beisner, Dr. Beisner is the associate professor of Historical Theology and Social Ethics, Knox Theological Seminary, and spokesman for the Interfaith Stewardship Alliance, which I had put in as a part of the record.

So we will start, and we are going to ask you folks, and I am sorry to do this, but your entire statement will be made part of the record, but if you would withhold your statement to about 5 minutes, we would appreciate it very much.

We will start with you first, since you came the furthest, Dr. Lomborg.

STATEMENT OF BJORN LOMBORG, ADJUNCT PROFESSOR, COPENHAGEN CONSENSUS CENTER

Mr. LOMBORG. Mr. Chairman, thank you very much. I apologize to the committee for being late, but you know what it is like flying these days. Thank you very much. I will be brief. I also have some slides up here.

Global warming has become one of the most preeminent concerns of our time, and this often clouds our judgment and makes us suggest inefficient remedies. As a result, we risk losing sight of tackling the most important global issues first, as well as missing the best long-term approach to global warming.

Yes, global warming is real, and it is caused mainly by carbon dioxide from fossil fuels. The total cost of global warming is $5 trillion to $8 trillion, which ought to make us think hard about how to address it.

However, the best climate models show that immediate action will do little good. The Kyoto Protocol, which I have brought along, the first slide, will cut carbon emissions from industrialized countries by about 30 percent below what they would have been in 2010, and by 50 percent in 2050. Yet, even if everyone, including the United States, lived up to the protocol's rules and stuck to it

throughout the rest of the century, the change would be almost immeasurable.

Senator INHOFE. Now, let me interrupt you just for a moment here, not on your time, but this is the same chart that I used in my opening statement. So you are saying you are in agreement with this chart?

Mr. LOMBORG. Well, this is one of the elite offers from the U.N. climate panel. Everybody would say the Kyoto Protocol in and of itself will do very little good. Essentially, it will postpone global warming for about 6 years in 2100.

Senator INHOFE. Thank you. You can continue.

Mr. LOMBORG. So the point here is to say that is fairly little, and likewise economic models tell us that the costs would be substantial, at least $150 billion a year. In comparison, the United Nations' estimate is half of that amount could permanently solve all of the world's major problems. It can ensure clean drinking water, sanitation, basic health care and education for every single person in the world now.

And so, global warming will mainly harm developing countries because they are more exposed and poorer, and therefore more vulnerable to the effects of climate change. However, even the most pessimistic forecast from the U.N. projects that by 2100, the average person in the developing world will be richer than the average person in the developed countries now.

So early action on global warming is basically a costly way of doing very little for much richer people far into the future. Therefore, I think one of the things we have to do is we need to ask ourselves if this should in fact be our first priority.

If I could just show you the next slide. We have actually conducted two, sorry. That is what we have already talked about. So I will show you the next one. We actually ran two Copenhagen Consensus priority-setting roundtables with some of the world's top economists and the top U.N. Ambassadors. They similarly found that Kyoto comes far down the list of global priorities. As you can see, they actually told us, and this is from the top economists, including four Nobel laureates, looking at all the different things we can do in the world. What they told us was that Kyoto Protocol was actually a bad investment, simply because it costs more than it does good. Whereas, they told us there are many other things we can do in the world that would do much more, as I try to show here, such as prevent HIV–AIDS, micronutrient malnutrition, free trade and prevention of malaria.

So it gives a sense of what it is that should be our top priorities. However, we still need to think about doing something about global warming. It doesn't mean doing nothing, but it does mean doing the clean, clever and competitive thing. Climate change should be addressed where effect is high and cost limited.

Such an example is the Asia Pacific Partnership, which you have talked about here today, which focuses on energy efficiency and the fusion of advanced technologies and electricity transport in key industry sectors. Because it focuses on some of the century's biggest emitters, including China, India and the United States, it is forecast to reduce global emissions by 11 percent in 2050. For ref-

erence, the full Kyoto would only reduce emissions by 9 percent in 2050.

In essence, the AP6 is picking up the smart, low-hanging fruit. Good examples would include the many Chinese coal plants that have heat rate deficiencies of around 25 percent, compared to U.S. coal plants which have efficiencies of 33 percent to 36 percent. The United States has a lot of expertise in retrofits and improving the efficiency of coal plants in China would not only reduce fuel inputs and air pollution, but also carbon dioxide.

The cost of the AP6, however, is unclear at the moment. It is seen as cheap and voluntary, but it is doubtful that entirely voluntary measures will achieve all of the AP6 potential. And certainly, in the long run, more clever measures will be needed.

For the future after 2012, we need not propose more Kyoto-style immediate cuts, which would be prohibitively expensive, do little good, and cause many nations to abandon the entire process. We should rather, as I show in the next slide, be focusing on investments in making energy without carbon dioxide emissions viable for our descendants. This would be much cheaper and ultimately much more effective in dealing with global warming.

I would suggest, and I would present to this committee, a treaty following up on the Kyoto Protocol, binding every nation to spend, say, 0.05 percent of GDP on research, development and demonstration of non-carbon-emitting energy technologies. This would worldwide provide some $25 billion in RD&D that would constitute an almost 25 fold increase over just what is right now used on renewables, and certainly a two and a half fold increase in the total RD&D.

This approach would be five times cheaper than Kyoto and many times more cheaper than a potential Kyoto II. It would involve all nations, with richer nations naturally paying the larger share. Perhaps developing nations should be phased in or mechanisms put in place to assist them financially and technically as in the AP6. It would let each country focus on its own future vision of addressing the energy and climate challenge, whether that means concentrating on renewables, fission, fusion, conservation, carbon storage, or searching for new and more exotic opportunities.

Such a massive global research effort would also have potentially huge innovation spinoffs. In the long run, such actions are likely to make a much greater impact than Kyoto-style responses. Researches at Berkeley actually envision that such a level of R&D could solve global warming in the medium term.

In a world with limited resources, where we struggle to solve just some of the challenges that we face, caring more about some issues means caring less about others. We have a moral obligation to do the most good that we possibly can with what we spend, so we must focus our resources where we can accomplish the most first.

I would suggest that rather than investing hundreds of billions of dollars in short-term ineffective cuts in carbon dioxide emissions, we should be investing tens of billions in research, leaving our kids and grandkids with cheaper and cleaner energy options.

Thank you very much, Mr. Chairman.

Senator INHOFE. Thank you, Dr. Lomborg.

Mr. Doniger.

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

Mr. DONIGER. Thank you, Mr. Chairman.

The Asia Pacific Partnership is symptomatic of the current Administration's failure to take meaningful action either at home or abroad. The United States has limited the terms of engagement strictly to voluntary measures with token government funding. On these terms, the partnership can't make any difference. I will expand on that in a minute.

But first, I want to talk about how time is running out. These are not my views. This is the view of the National Academy of Sciences. We need significant emission reductions in a very short window of time, and delay only makes the job harder. I quote the National Academy in a report last year: "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," and it went on to say, "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."

The evidence of impacts continues to pile up, Mr. Chairman: stronger hurricanes, melting ice caps, killer heat waves, severe droughts. NASA reported last week that the Arctic ice cap is melting at an unprecedented rate. By the way, a major scientific report published in Nature last week confirms that solar radiation changes cannot explain any substantial fraction of global warming; that the bulk of it is from human causes.

Scientists have recently detected accelerated melting of the Greenland and Antarctic ice sheets. If either one of those ice sheets goes, we are talking about a sea level rise of 20 feet, with utterly disastrous implications for coastal areas around the world and for poor people who live in them around the world.

There is only a short window of time to stop this from happening. Since the start of the industrial revolution, we have had carbon dioxide concentrations rise from about 270 ppm to 380 ppm. If we want to keep from experiencing more than a two degree increase in temperature, worldwide average, we have to keep the concentration from rising much above 450 ppm. We can do this if we start to act in the next 5 or 10 years, together, the United States and other countries. And that is the choice: Act now.

If I could draw your attention, please, to the chart on page 4 of my testimony. I was not able to project this here. I didn't bring a poster-board because I was led to believe a PowerPoint would be acceptable, Mr. Chairman. I draw your attention to page 4, a chart called Slow Start Means Crash Finish.

If we start now on reductions, together with other countries, we can achieve the goal of staying below 450 parts per million, with an annual reduction in emissions at an ambitious, but achievable, level of 3.2 percent per year. But if we wait 10 or 15 years to start on this, the job becomes immeasurably harder, and we are talking then about having to make reductions of over 8 percent per year in the out years, something which simply can't be imagined. So the cost of Mr. Lomborg's proposal to wait and just invest in future

technologies is to make the job immeasurably harder to stay within any concentration objective.

Here is a commonsense illustration. Imagine that you are driving a car at 50 miles an hour. You see a stop light ahead of you and a busy intersection. If you apply the brakes early, you can easily stop your car at that intersection with a gentle deceleration. The longer you wait to start braking, the harder the deceleration. There is some room for choice, but the higher your speed, the earlier you must start braking. If you wait too long, you will find yourself in the middle of the intersection with your forehead through the windshield.

The advocates of the Asia Pacific Partnership's voluntary approach argue that it is still cheaper to delay because somehow we will find breakthrough technologies and they will enable faster reductions later. Well, we do need investment in breakthrough technologies, but without a market signal, the breakthrough technologies end up on the shelf with nobody applying them. It is the market signal that motivates private sector investment and it is so odd to hear so many advocates of the free market steer away from sending a market signal to motivate change in global warming emissions. This is the market-friendly way to do it, and everyone else in the world has got it except us here in the United States.

The constituency for dealing with global warming is broadening. I would point out in particular that there is a very large religious constituency for dealing with global warming. As we speak here today, there is a conference going on elsewhere in Washington, the World Climate Summit, and the panel this afternoon is addressed to religious voices on global warming. There are Mormon, Catholic, Presbyterian, Evangelical, Jewish and Islamic speakers, all speaking toward the need to deal with global warming, and largely because the threat of global warming falls heaviest on the poor.

I agree that we need to tackle malaria, HIV, bad water, and all the things that Mr. Lomborg mentioned. But we don't have such a stark choice. This is a rich world, with a large gross domestic product around the world. If we hack off a very small amount of that in a market-friendly way, we could tackle all of these problems. That is why groups like Christian Aid, and I would like to submit this report for the record, believe that climate change is a great threat to the world's poor, and dealing with this is a service to the world's poor. If I may submit this for the record?

Senator INHOFE. Yes, without objection.

[The referenced document follows on page 101.]

Senator INHOFE. Your time has expired.

Mr. DONIGER. Thank you very much.

Senator INHOFE. Dr. Beisner.

STATEMENT OF E. CALVIN BEISNER, ASSOCIATE PROFESSOR OF HISTORICAL THEOLOGICAL AND SOCIAL ETHICS, KNOX THEOLOGICAL SEMINARY; SPOKESMAN FOR THE INTERFAITH STEWARDSHIP ALLIANCE

Mr. BEISNER. Mr. Chairman, members of the committee and distinguished guests, thank you for inviting me to speak to you today. Having never before this year been significantly involved in politics, other than to vote in elections, it is strange to find myself

here. But my moral convictions as a Christian persuade me that I must speak out on an issue on which literally millions of lives hang in the balance.

As a professor of Christian ethics, I distinguish principles and motives from applications. God, through his word, has given us absolute moral principles: You shall have no other gods before me; you shall not worship idols; you shall not take the name of the Lord in vain; remember the Sabbath day to keep it holy; honor your father and mother; you shall not murder, commit adultery, steal, bear false witness, or covet. As for motives, he says: Do justice, love mercy, and walk humbly with your God.

These 10 commandments and these three motives apply to all people everywhere in all circumstances. But it isn't always obvious how principles apply. Even with the best motives, we may unintentionally do great harm. It is easy to look at an apparent threat and think, we can solve that this way. But sometimes, we misunderstand the nature, the causes or the extent of the threat, or fail to compare one threat with others that might be more significant.

And so we prescribe solutions that won't work, that unintentionally cause more harm than they prevent, or that, particularly relevant to today's discussion, divert investment from more helpful measures. What would have happened, for example, had Congress legally mandated the use of DES, a drug widely thought in the 1950s to reduce the risk of miscarriage, but later found to be ineffective for that, but to raise the risk of cervical and uterine cancer for women exposed to it in utero? Great harm instead of the good intended, and reversing its use would have taken far longer than it did without the legal mandate.

For 18 years, I have been studying the ethics, the economics, and the science of environmental stewardship, especially global warming. I have read major books on global warming by leading scientists on all sides of the controversy. I studied the IPCC assessment reports and read hundreds of scholarly and popular articles. My study convinces me that there is a major disjunct between the best science and economics in the field, on the one hand, and popular media and public opinion on the other.

Time forbids me to go into detail in my oral testimony, but I have submitted fuller written testimony and request, Mr. Chairman, that it be included in the record.

Senator INHOFE. Without objection, so ordered.

Mr. BEISNER. Popular opinion is that human emissions of carbon dioxide are the majority cause of current warming, which is greater than any in history and will become catastrophic by the middle of this century, and that we can and must prevent this catastrophe by reducing CO_2 emissions. In contrast, as climatologist Roy Spencer, environmental economist Ross McKitrick, energy policy analyst Paul Driessen and I argued in A Call to Truth, Prudence and Protection of the Poor: An Evangelical Response to Global Warming, submitted herewith, and again I would ask that it be made part of the record.

[The referenced document follows on page 179.]

Mr. BEISNER. The best science and economics indicate that current warming is within the range of natural variability. Human emissions of CO_2 are a minor cause of global warming, but they en-

hance plant growth and so contribute to feeding the human population and all other species.

Global warming is unlikely to become catastrophic in the foreseeable future. No achievable reductions in CO_2 emissions would reduce future temperatures detectably, let alone enough to avert catastrophe. And such efforts would fruitlessly divert scarce resources from other endeavors that would be of far greater benefit to humanity.

Rather than focus narrowly on a single problem, we must choose carefully of where to invest our limited resources. The hundreds of billions of dollars per year it would cost the global economy to significantly reduce CO_2 emissions would be of little or no benefit to humanity because they would cause little or no decrease in future temperatures.

When the scholars at the Copenhagen Consensus ranked 17 challenges facing humanity, the three best investments were fighting communicable diseases, fighting malnutrition and hunger by providing micronutrients, and liberalizing trade. While the three worst investments all had to do with reducing CO_2 emissions to mitigate global warming. Money would be far better spent on AIDS and malaria prevention, water sanitation and nutrition.

A clean, healthful environment, being a costly good, wealthier communities better afford it than poorer ones. And affordable energy is crucial to creating wealth. Electrifying the billion or more homes that use wood and dung as their chief fuels for heating and cooking would eliminate most of the 1.6 million premature deaths per year that the World Health Organization attributes to indoor smoke. It would also leave the dung on the land to fertilize it, and it would leave the wood growing in the forests.

Sharing technology with rapidly growing economies like India and China would speed both their adoption of cleaner fuels and their economic development. The strong correlation between economic development and improved health and life expectancy underscores the morality of such a policy. It would be morally unconscionable to force the world's developing countries to delay their climb out of poverty by denying to them, as would any serious cuts in CO_2 emissions, the cheap, abundant energy available from carbon fuels.

The Bible tells us to remember the poor. We need not, in order to identify the morally preferable global climate policy, resolve the enormously complex controversy over the causes and extent of global warming or the possibility of mitigating it. There is one thing we already know quite well: a richer society endures any catastrophe better than a poorer one. If we want to help the world's poor, we shall do so far better by helping them become wealthy and able to adapt to whatever temperature the future holds, than by slowing their economic development, condemning them to additional generations of poverty and its attendant suffering, and depriving them of the wealth they need to triumph over any future catastrophe.

I urge you, therefore, to support policies that will promote economic development for the sake of the world's poor and the world's environment.

Senator INHOFE. Thank you, Dr. Beisner.

Let me start off by saying, and asking you a question because you may not have been here when I put into the record the letter signed by over 140 of the evangelical groups and individuals representing those groups, and scientists who have studied this. The letter that was submitted for the record on the other side did single out nine organizations.

So I will start with a question with you. What is your response to those who imply that there is a broad consensus among religious leaders to impose mandatory caps?

Mr. BEISNER. Senator, in the past year and a half or so, a group of people tried to persuade the National Association of Evangelicals to adopt a statement that would take a position along what we would say would be the majoritarian popular opinion on this. The Interfaith Stewardship Alliance contacted the National Association of Evangelicals and made a case to its board that there was not adequate scientific consensus about that, and I document that in the paper that we have submitted today.

Also, more importantly to the NAE, that there was not consensus among Evangelicals about it, and the NAE's board agreed with us and issued a letter January 26 saying that that was not a consensus issue among evangelicals, and that therefore NAE would not do so.

The Southern Baptist Convention in July adopted a statement that also refused to do this, and our statement, A Call to Truth, Prudence and Protection of the Poor, has been endorsed, as you noted, by about 140 people, including especially evangelical scientists and economists with expertise relevant to this issue. We didn't simply go after big name religious leaders. We went for people who had actual expertise, rather than those who would answer, for instance, World Magazine, saying, you know, I have to admit I really didn't know anything about the science, but I wanted to make it clear that I care about the poor, I care about the environment.

We think you have to both care and know the science.

Senator INHOFE. I appreciate that, Dr. Beisner. I also when this first idea came out to try to get a bunch of evangelicals, they were using people's names without their permission, such as Mr. Dobson, Chuck Colson and others.

Mr. BEISNER. That is correct.

Senator INHOFE. Dr. Lomborg, I looked up in the written statement of Mr. Doniger, and I couldn't find this, where he used the term immeasurably harder, but I notice you perked up when he was referring to your approach. Is there anything you would like to do to respond to his statement?

Mr. LOMBORG. Well, I would tend to say that what Mr. Doniger was trying to argue was that it would be really great if we could do all good things. He was actually suggesting we can do all things. Of course, we being a rich society, in principle we could do a lot of good things. But I do think we have to come down to the fact that we don't. And so it does seem to me that we have to make these kinds of decisions.

He is telling us it is going to be hard to stop at 450 ppm. That is absolutely true. But I again have to ask, why stop at 450? I would actually like to stop at 380, but again, of course, we have

to ask ourselves, where should we stop at how many people die from HIV–AIDS? It seems to me that the right number if zero. How many people should die from malaria? It seems to me the right number should be zero.

The point is, we would like to do all good things. And so we come back to the discussion of saying if we live in a world where we don't actually do all good things, we have to ask at least where should we start; where would we do the most good.

I do agree with Mr. Doniger that we have to also think about climate change. I do believe that it is true it is happening, but it is one of the many things we need to figure out. I am simply suggesting one way of dealing with this would be to say there are many great investments, as I tried to point out with the Copenhagen Consensus, where we can do a lot of good. HIV–AIDS and malaria, as Mr. Doniger also agreed that we should do, and we can also look at the long-term impact of climate change and say at least we can probably stabilize it. That was what I was referring to would be OK.

Senator INHOFE. OK. That is very good.

Dr. Beisner, you are familiar, some of the others aren't, of my activities in Africa over the last 10 years. I have made more trips there than all Senators in the history of America combined. I am very sensitive to the problems that are there.

So what I would like to ask you is, if carbon caps were imposed what impact this would have on the efforts to bring electricity to some of these African countries, which they consider to be the most urgent need that they have?

Mr. BEISNER. There are a number of different ways, Senator, that that question could be approached. Let me just focus on one. Economic development is necessary for making the investments that are required to provide electrification. Obviously, it being a costly thing to do, the wealthier you become, the more you can afford to do it.

One very important part of economic development in Africa and in other developing areas of the world is trade with the external world. Because caps on energy use, caps on carbon would at this point practically also be caps on energy use, in wealthier countries would curtail economic growth, and in fact probably even cause some negative economic growth in those countries. Those countries' demand for imports from developing countries would decline. That would cause a net loss of income to those developing countries which would have a negative effect on their economic development, which in turn makes them less able to afford electrification.

It slows the electrification that they need to deliver them from the various diseases that come from vectors that enter their homes because they can't close up and air condition, and so on.

Senator INHOFE. My time has expired. They do burn such things as the very dirtiest type of coal and dung and other things. This would somehow preclude them from getting electricity as a substitution.

Mr. BEISNER. Yes.

Senator INHOFE. Anyway, thank you very much for your response.

Senator Jeffords.

Senator JEFFORDS. Mr. Doniger, do you have any comment on the testimony of the other witnesses? In particular, what do you think of the suggestion of Mr. Lomborg's written testimony that we create an international research and development fund?

Mr. DONIGER. Senator, I think that having a higher level of research is essential. But the reason the research has dropped off to such a low level on energy technologies is that there are no market signals to make it important. The primary research comes from the private sector. So we have the government now spending $100 million, I think I heard Mr. Connaughton say, to build one FutureGen plant with carbon storage.

While they plan that and while they pass the hat to South Korea and China and so on to join in that project, we have private sector companies setting up their own projects without government support. We have carbon storage technology being implemented underneath the North Sea. It is being implemented soon in Africa. It is being implemented in Southern California by private sector consortiums working on their own. They are betting there will be a market signal. If there is market signal, you will see I would say trillions of dollars flow to the clean energy technologies just by the workings of the market.

The research and development is important, but a little tiny pool of research and development, even at $25 billion, looks like nothing compared to the $6 trillion in energy infrastructure investments that are coming in the next 30 years. That is what we need to steer in a cleaner direction.

It is not about preventing anyone from getting electricity. It is about hastening the energy development, but in a cleaner path.

Senator JEFFORDS. The Bush administration argues that a go slow approach, using research and development, be the least costly approach to the climate problem. But waiting would mean that more emissions go into the atmosphere and more coal-fired powerplants would be built that can only be controlled through expensive retrofitting. Does it make sound economic sense to continue to wait for actually reducing emissions? Or is that a false economy?

Mr. DONIGER. I think it definitely is a false economy. What is happening is a new generation of coal-fired powerplants is being built. Every year, millions of new vehicles are built and put on the roads. Each of these things have lifetimes. Cars have a lifetime of a decade. Powerplants have a lifetime of five or six decades.

If we build a new generation of dirty technologies that have high carbon dioxide levels, we just buildup the burden in the atmosphere and make the job of reducing emissions so much more difficult, so much more expensive later. So this is a false economy to go slow.

The true economy is to get on this and do it smoothly and do it over a period of years, a period of decades where you still have some time to do this at rates that don't disrupt the economy.

Senator JEFFORDS. Thank you.

Senator INHOFE. Thank you, Senator Jeffords.

Senator Lautenberg.

Senator LAUTENBERG. Mr. Chairman, a very interesting discussion taking place here. Some of it is hard to comprehend when we see how different the views are. Among the conditions that Mr.

Lomborg recommended that we pay some attention to, he included HIV–AIDS et cetera. All of you saw it.

We don't discuss cancer research. We don't discuss reducing automobile gas consumption. We don't discuss war. You are aware of our war costs, Mr. Lomborg? They are pretty significant. We don't discuss those things. How are they left out when we talk about prevent HIV–AIDS? By the way, there is a new product out called Gardasil. It will protect women against cervical cancer, if it were to be given at an early stage of perhaps sexual activity. It can eliminate that, the largest killer of women in Third World countries.

So we are making progress in these things, but why do we have to choose between the threat that global warming brings to us, when NASA, National Science Foundation, it is a subject of great interest to me. I see what is happening with the polar bear population. I see what is happening with other animal species populations. It is dwindling down.

Part of the ecology that sustains life as we know it now, those things instead, I mean, I think you are remarkably casual about the fact that we shouldn't be spending money on Kyoto; that the value isn't there. And we hear from Mr. Doniger and the NASA report that the ice melt is proceeding at an alarming rate. I have been to the South Pole. I take a deep interest in that. I went there to visit with the National Science Foundation.

How does that square, Mr. Lomborg, with other agencies who are saying, hey, let's get on with these things. Let's mandate that we make changes that are possible to make, if we had better performance in our automobile engines. Do you think we ought to change our tax structure and maybe have the richest among us pay more in taxes? Because I am amazed, frankly, and you will forgive me sir, your relatively simplistic choice of what it is we can do with investing in the world health.

Mr. LOMBORG. Mr. Senator, I think there are three questions in there. First, the tax one, I am not going to presume to tell you how you could figure taxes. I come from Denmark where we tend to think, like you were suggesting.

Senator LAUTENBERG. No, I didn't suggest it. I asked what you thought about it.

Mr. LOMBORG. Yes. But the other two issues, global warming is important. Yes, there are a lot of problems accumulating from global warming. I think Mr. Doniger is right in pointing out those issues are there as well.

I think we need to, just as you were pointing out the polar bears, we should also point out that a lot of people die from indoor air pollution. A lot of people die from all these other kinds of issues.

Then you rightly point out that we have a lot of other concerns. We talk about cancer research. We talk about military expenditure. The reason why we looked at just some of those issues was because we said global warming and investment in HIV–AIDS and some of these other issues are typically about helping other people. It is about being altruistic. Mostly what we do when we think about cancer research, and certainly when most people think about military expenditure, it is about national interests.

Senator LAUTENBERG. No, I think about my family. I think about my son going to war, as I did some years ago.

Mr. LOMBORG. Yes.

Senator LAUTENBERG. I think about my daughter's exposure to breast cancer, and things of that nature.

Mr. LOMBORG. Yes, and that is what I mean. That is much more a national issue, so that is perhaps arguably much better dealt with in a democracy like the American. But when we talk about international failure, that is both in carbon dioxide pollution, but also in HIV, malnutrition, and some of these other things. The, you might say, 1 percent that we do spend altruistically just trying to do good in the rest of the world, that is the argument that we said at least we want to make sure that we spend that well.

I am all for spending more on trying to do altruistic good in the rest of the world, but we should still look at what are the benefits and costs, and what the Copenhagen Consensus, some of the world's best economists told us, was if we spend $1 on prevention of HIV–AIDS, we end up doing $40 of social good. If we spend $1 on the Kyoto Protocol, end up doing about 2 cents worth of good. And so the argument is simply do the $40 before you do the 2 cents.

Senator LAUTENBERG. Mr. Chairman, forgive me, just for a word more on that. We spend a lot in research on HIV–AIDS, not enough. We spend it on cancer. We spend it on other health conditions. But we don't spend a lot on preventing global warming directly.

Thank you.

Senator INHOFE. Thank you, Senator Lautenberg.

Senator Boxer.

Senator BOXER. Thanks, Mr. Chairman.

Well, this has been certainly very interesting for me. I think, Mr. Doniger, you speak for me. I am not going to ask you questions because I think you get it. You understand it. It makes sense. If you have a problem, you go to solve it. We are going to solve it together. We know what to do.

And Mr. Lomborg, I don't quite get where you are coming from. I mean, you say let's spend billions and billions of dollars on energy efficiency. I agree. That is going to help us. Then you say we have to figure out essentially how we can spend our dollars better. That is absolutely right. Why don't you figure out what we are spending on more in the world? Figure it out. I can guarantee you, it is trillions and trillions.

That is a false choice you are setting up. We have to do everything. That is our job. God put us on this earth to solve the problems and protect the people. Whether it is foreign policy, domestic policy, whatever challenge we have, we can do it. It is a matter of making smart choices.

Now, that leads me to you, Mr. Beisner. Is that the way you say it?

Mr. BEISNER. Beisner.

Senator BOXER. Mr. Beisner, you said you just came into politics, but I have you quoted in newspapers from 1994, making these same arguments that the religious people shouldn't get involved in this. And you have lost because now they are getting more and

more involved. I am going to quote to you again from a letter we put in the record from a group including Evangelical Lutherans in America: "God has called each of us to protect the poor, the voiceless in creation itself. Our faith traditions and denominational policies make clear that this call is a mandate requiring action. Just as a scientific consensus has emerged about the need to address atmospheric concentrations of greenhouse gases, so too a broad consensus among religious leaders and organizations has emerged to respond to our shared understanding of God's call for environmental stewardship and the care of our sisters and brothers around the world."

So I think that your leadership on this, and bless your heart, you worked hard. You warned them not to do it. They didn't listen to you, and they are taking this up. I couldn't be more excited as a member of this committee. I am going around the country meeting with religious leaders, and it is most exciting.

Now, you make a point, it is better to be rich to help the poor. I am not sure I exactly get that, but let me put it this way: It is hard to help poor people or any people if the warnings are correct and we face the type of catastrophes is we do nothing. It is hard to help people, for example, if they are under water. It is hard to help people if the worst happens.

So I think it doesn't make sense. I am sorry. I have tried every which way to understand you. And then, I guess the questions I have for you, you wrote a letter, Mr. Beisner, on July 7, 2006, a letter to the editor: "More than 17,000 scientists have signed a petition denying that human action is the main cause of global warming." Right?

Mr. BEISNER. Correct.

Senator BOXER. When was that letter signed by those scientists?

Mr. BEISNER. That was I believe 1998.

Senator BOXER. Yes, 1998. Well, the world has moved on, sir. We know a lot more now, sir, and we have been doing research on this. So you are referring to an 8-year old petition which is absolutely obsolete. Now, we have 11 National Academy of Sciences. We have all these religious people. So, I mean, as I say, bless your heart for what you do. I know you volunteer for a lot of these things. But I just wonder, do you know that some of the organizations you volunteer for are funded by Exxon-Mobil?

Mr. BEISNER. Yes, I do.

Senator BOXER. OK.

Mr. BEISNER. I also know that adding an argument in ad hominem circumstantial is a logical fallacy.

Senator BOXER. Look, I am just trying to put something on the record here. I think it is important, and I am putting it in the record, and you can give me your intellectual answer to it, but it doesn't phase me one bit. You are volunteering for an organization that is funded by Exxon-Mobil. I think that they have a certain bias.

You know what? They are allowed to. It is a free country. Good for them. But I just feel we ought to know when witnesses come here who they are actually representing. So I just want to say to my Chairman, I am a little feisty today because I have worked

seven straight days without any time off, and so if I am extra feisty, please forgive me.

This is an issue that is so important to us. I am excited that we have had this hearing today. I am glad that my Chairman is willing to have more hearings. I am just hopeful that we can in fact reach across the aisle. We are working. We are trying to get support for cellulosic fuels. We are working together on that and some other things that maybe at the end of the day we do what Mr. Lomborg says, that we do the right thing, and we don't have to discuss our disagreements. We will just do something that is going to help, and that is where I am at at this point.

Thank you.

Senator INHOFE. Thank you, Senator Boxer.

I want to thank our witnesses. This was not supposed to be a hearing on global warming. It was on the Asia Pacific Partnership. I apologize to my witnesses there that it turned into this. I would have to say, too, if you had one that we would want to talk about the most, a lot of the recent science. Just in the last week, the geophysical research letters came out with 50 percent of them stating that 50 percent of the warming we are experiencing over the last 100 years is due to solar activity. Oddly, I think that is one of the more obvious things that we should know. The sun does have something to do with it. They are predicting now that is going to be followed by a cooling period.

The 60 scientists in Canada have written the prime minister, Prime Minister Harper, saying, "If we had known in 1997 what we know today about Kyoto, we would not have signed." But again, that would come in a debate on this subject, which this is not.

So I thank very much the witnesses, all three of you, for coming and for enduring this. It has been very helpful, and I think we have an idea here that will work and will reduce CO_2 if that is necessary, but at the same time, SOx, NOx, mercury and real pollutants.

Senator LAUTENBERG. Mr. Chairman, I will take the liberty of speaking out here and saying to you that, you know, I have been on other committees where the rules and the subject weren't so precisely evolving. You have to get sometimes obtuse roots to get to the subject.

Senator INHOFE. Yes, and I love all of you dearly.

Thank you very much. We are adjourned.

[Laughter.]

[Whereupon, at 6 o'clock p.m. the committee was adjourned, to reconvene at the call of the chair.]

[Additional statements submitted for the record follow.]

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

Thank you, Mr. Chairman, for holding this hearing.

Since 2002, the Bush administration has acknowledged that global warming threatens our nation's well being, and that the United States accordingly should slow, stop, and reverse the current growth in its greenhouse gas emissions.

Unfortunately, the Administration's policies will not slow or stop, much less reverse those emissions in time to avoid the shame of leaving our grandchildren a world of flooded coastlines, increased drought, more destructive storms, rampant disease, and more armed conflict.

The only specific target President Bush has endorsed is reducing the "greenhouse-gas intensity" of the U.S. economy by 18 percent in the decade between 2002 and 2012. What that adds up to is actually a 14 percent increase in the nation's annual greenhouse-gas emissions over that same period. That is the identical rate of increase that we have seen over the past 15 years. So even if President Bush's policies live up to his commitment, they will not slow the growth in U.S. greenhouse-gas emissions at all.

As it happens, the Administration's existing policies are insufficient to meet even President Bush's inadequate commitment. The centerpiece of those policies, the Asia-Pacific Partnership that is the subject of today's hearing, is nothing more than a series of meetings in which representatives from the United States, Australia, China, Japan, Korea, and India will discuss ways in which they might work together to promote cleaner, more efficient technologies to address pollution reduction, energy-security, and climate-change concerns. There is nothing binding about the Asia-Pacific Partnership, and its charter does not even set any targets for reducing greenhouse-gas emissions.

The most tangible step the Administration has taken toward meeting its inadequate commitment is to launch "FutureGen," a public-private partnership that is spending ten years to build a facility that will make electricity and hydrogen from coal without emitting any greenhouse gasses. As laudable as this single project is, it will not change the fact that, in the absence of the real climate policies that the Administration still opposes, the U.S. private sector will spend the next ten years building more than a dozen new coal-fired powerplants that will release all of their global warming pollution into the atmosphere.

The Administration's half-measures reflect a mentality that now lags behind the views of many of the large American businesses that emit greenhouse gasses. More and more of those companies acknowledge that the United States can and must institute a mandatory, economy-wide emissions cap to curb this nation's negative influence on the world's climate.

The country's business leaders are coming around to the position that John McCain and I staked out in 2003, when we introduced the first bill to institute a mandatory, economy-wide greenhouse-gas emissions cap and allow companies to trade emissions allowances beneath that cap. By literally mandating that U.S. global warming pollution actually be cut, our bill attaches a price to emitting global warming pollution. By instituting a market-based system with plenty of built-in flexibility, and by investing heavily in technology deployment, the bill gives industry the tools it needs to limit its emissions in affordable ways that end up creating jobs and increasing the competitiveness of American businesses in the global marketplace.

As you all know, John and I forced the Senate to vote on our Climate Stewardship Act in 2003 and again in 2005. The bill that we will reintroduce early next year, hopefully again with the co-sponsorship of my fellow committee member Senator Obama and of Senate Snowe, will adhere to the core principles I have already mentioned.

It will also include improvements designed to further reduce compliance costs; further protect American workers; further fund the early deployment of safe, zero-emissions energy technologies; accelerate the spread of products and techniques that reduce energy usage without compromises; and reward the early action that some of the nation's most climate-responsible businesses are taking already.

This past July, my fellow committee members, Jim Jeffords and Barbara Boxer, introduced a bill to mandate aggressive reductions in the U.S. economy's greenhouse-gas emissions. Senator Feinstein has announced her intention to do the same in the next Congress. In May, my friend Tom Carper reintroduced his bill to cap the U.S. power sector's greenhouse-gas emissions.

While John and I will push for enactment of our bipartisan, economy-wide, cap-and-trade bill in the next Congress, we welcome our colleagues' bills as highly-productive contributions to the Senate's work on this crucial issue, and I for one look forward to working with them.

The Bush Administration, however, has some serious catching up to do.

Thank you, Mr. Chairman.

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

INTRODUCTION

Mr. Chairman, I am pleased to testify today on the Asia-Pacific Partnership on Clean Development and Climate (the Partnership), announced last year and launched in January 2006 by President Bush and the leaders of Australia, China, India, Japan and South Korea. This Presidential initiative establishes an innovative public-private collaboration for addressing the interconnected challenges of assuring economic growth and development, poverty eradication, energy security, pollution reduction, and mitigating climate change. The Partnership's six members represent about half the world's economy, population, and energy use. Together they produce about 68 percent of the world's coal, 61 percent of its cement, 50 percent of its net electricity generation, 54 percent of its steel, and 40 percent of its aluminum. Partner countries also emit significant amounts of air pollution and around 50 percent of the world's carbon dioxide emissions from fossil fuels. As I will explain in greater detail below, the Partnership is working initially in eight major sectors to share technologies and practices, open up markets and reduce barriers, to significantly increase investment in the best of today's technologies and accelerate the development and use of the best technologies working their ways through public and private research. We are focused on achieving practical outcomes in the areas of: cleaner and lower carbon emission fossil power technology, renewable and distributed energy systems, power generation and transmission efficiency, steel, aluminum, cement, coal mining, and buildings and appliances.

Mr. Chairman, I would like to thank you, and members of this committee and the Senate, for your broad bipartisan support for the Asia-Pacific Partnership. The Partnership is a key means of implementing a strong, bi-partisan Senate amendment that became Title XVI of the Energy Policy Act of 2005 (EPAct 2005). The Partnership is consistent with the Clean Energy Technology Exports Initiative (CETE) discussed in the FY'01 Senate Energy and Water Development Appropriations Bill. Many aspects of the CETE initiative are now found in EPAct 2005 and are being implemented through the Partnership. The Partnership targets the kind of fast-growing, middle-income industrializing countries on which EPAct asks us to focus.

The Partnership is a team effort and requires a team budget to administer. Reflecting the Partnership's philosophy of taking an integrated approach, funding for implementing the initiative is spread over four agencies: the Department of State (State), the Department of Energy (DOE), the Environmental Protection Agency (EPA), and the Department of Commerce (DOC). I look forward to using this opportunity to discuss the benefits of the Partnership and the urgent need for Congress to support the President's $52 million fiscal year 2007 budget request, which will help leverage billions of dollars in private and public investment in a more secure, more efficient, cleaner and lower greenhouse gas energy future.

UNITED STATES POLICY OBJECTIVES

The Asia-Pacific Partnership will help bring into the international arena U.S. policy objectives for improved energy security, improved air quality and public health, and reduced greenhouse gas intensity. At the same time, our partners share these objectives and will share with us their complementary national strategies.

Improve Energy Security

In order to improve our nation's energy security, the Administration is focusing on the development and deployment of new, clean technologies to reduce our reliance on foreign sources of energy and, ultimately, to diversify away from a hydrocarbon society. The Administration is implementing policies to advance these objectives in both the power generation and transportation sectors.

Electricity Generation

To secure our long term electric power generation needs, we are working to strengthen and increase the availability of domestic sources—abundant renewable energy, clean coal, and emission-free nuclear power, as well as what I would describe as our massive "reserves" of energy efficiency and conservation. We are implementing and developing policies that ensure current and future energy supplies will meet our more stringent requirements for air quality improvement and the need for greenhouse gas mitigation.

Advanced Energy Initiative.—In his State of the Union Address this year, the President announced his new Advanced Energy Initiative (AEI). The AEI includes programs promoting the use of technologies that reduce oil use by improving efficiency, expansion of alternative fuels from homegrown biomass, and development of

fuel cells that use hydrogen from domestic feedstocks; and programs to change the way we power our homes and businesses, such as addressing the high costs of natural gas and electricity by generating more electricity from clean coal, advanced nuclear power, and renewable resources such as solar and wind.

One of the core objectives of the AEI is to change how we power our homes and offices through increased investment in revolutionary solar and wind technologies. To fulfill solar energy's promise, the President proposed a new Solar America Initiative. The Solar America Initiative will accelerate the development of advanced photovoltaic (PV) materials that convert sunlight directly to electricity, with the goal of making solar PV cost-competitive with conventionally generated electricity such as coal and nuclear by 2015. As the per-unit cost for these advanced PV technologies falls, sales volume will go up, driving innovation and further cost reductions. Globally, attempts to bring electricity to the developing world will frequently employ solar PV as an alternative.

Wind energy is one of the world's fastest-growing energy technologies. In 2005, the U.S. wind energy industry installed more than 2,300 megawatts (MW) of new wind energy capacity—or over $3 billion worth of new generating equipment—in 22 states. That capacity is roughly equivalent to four typical coal powerplants. Areas with good wind resources have the potential to supply up to 20 percent of the electricity consumption of the United States.

To expand the generation of clean energy from wind, the President has committed to advance the use of wind technology. We are working to help improve the efficiency and lower the costs of conventional wind turbine technologies, and help develop new small-scale wind technologies for use in low-speed wind environments. Combined with the ongoing efforts to expand access to Federal lands for wind energy development, our efforts could help dramatically increase the use of wind energy in the United States.

EPAct 2005 provides a number of tools to help assure that renewable energy will become a viable, affordable source of energy to power our homes, businesses, and industries. A few of the most significant provisions deal with tax credits and research and development. The Renewable Electricity Production Credit (REPC) is a 1.5 cent per kilowatt-hour tax credit with a multi year extension that may last for up to 10 years. This credit is adjusted annually for inflation. Qualifying electricity generating resources includes wind, open-loop and closed-loop biomass, geothermal energy, small irrigation power (150 kW–5 MW), municipal solid waste, landfill gas, and hydropower.

EPAct 2005 also establishes a 30 percent tax credit up to $2,000 for the purchase and installation of residential photovoltaic (solar electric) and solar water heating property. An individual can take both of these credits for a total of up to $4,000. A 30 percent tax credit up to $500 per 0.5 kW is also available for fuels cells.

Another important EPAct initiative is the Renewable Energy Production Incentive (REPI). REPI provides financial incentive payments for electricity produced and sold by new qualifying renewable energy generation facilities that are not eligible for tax credits. Qualifying facilities include publicly owned utilities, not-for-profit electric cooperatives, and tribal entities that produce electricity from renewable sources. These facilities are eligible for annual incentive payments of 1.5 cents per kilowatt-hour for the first ten year period of their operation, subject to the availability of annual appropriations in each Federal fiscal year of operation.

Recognizing that additional research and development is still critical to improve the market penetration of renewable power generation, EPAct authorized $2.2 billion for renewable energy sources including hydro, wind, geothermal, and solar.

Complementing these incentives for renewable energy, EPAct provided for loan guarantees to spur investments in projects employing renewable technologies. Secretary Bodman recently unveiled DOE's guidelines for the loan guarantee program which included providing for leveraged funding opportunities up to $2 billion.

Clean Coal.—The United States has vast coal reserves and about half of its electricity is generated from this fuel. Because coal has great potential to provide domestically secure, cost-efficient electricity, advanced coal-based power generation is vital to energy security while meeting air quality needs and setting a foundation for greenhouse gas mitigation. The goal of the Coal Research Initiative (CRI) is to remove technological market obstacles and produce public benefits by conducting research, development, and demonstration of coal-related technologies that will improve coal's competitiveness in future energy supply markets. As part of the CRI, the Clean Coal Power Initiative (CCPI) is a cost-shared program between the government and industry to demonstrate emerging technologies in coal-based power generation, thus accelerating their path to commercialization. The FutureGen project, also a part of CRI, is a 10 year, $1 billon government-industry effort to design, build, and operate the world's first near-zero atmospheric emission coal-fired

powerplant. This project, which cuts across many areas, will incorporate the latest technologies in carbon sequestration, oxygen and hydrogen separation membranes, turbines, fuel cells, and coal gasification. The governments of India and South Korea have recently committed to join and contribute financially to FutureGen. The FutureGen Alliance also includes Chinese and Australian companies contributing to the private sector cost-share. As an important complement to this effort, we are aggressively pursuing the promise of cost-effective techniques for CO_2 sequestration through the Carbon Sequestration Leadership Forum, comprising 21 countries and the European Commission. Ten projects have been recognized by the Forum, including four with U.S. participation. The United States also leads the Regional Carbon Sequestration Partnerships project, which began in September 2003, and is a broad-based collaboration of industry and the research community to help identify and test the most promising opportunities for implementing sequestration technologies in the United States and Canada.

Nuclear Power.—Nuclear power provides an abundant, affordable, clean, and safe source of energy. The United States has 103 commercial nuclear powerplants operating in 31 states. Nuclear powerplants supply approximately 20 percent of America's electricity. The clean air benefits of nuclear energy are enormous. Last year, the domestic use of nuclear energy prevented the release of up to 3 million tons of sulfur dioxide and 1 million tons of nitrogen oxide. The use of nuclear power has also avoided the emission of 700 million tons of carbon dioxide per year, an amount nearly equal to the annual emissions from 136 million passenger cars.

While nuclear plants have had dramatic increases in their efficiency, offsetting the need to build several new plants fueled by other sources, no U.S. power company has constructed a nuclear plant in about 30 years. However, nuclear energy is making a resurgence. In the past year about 12 companies have expressed an interest in building new plants.

The EPAct 2005 included a number of nuclear related provisions that address both existing nuclear energy facilities and set the stage for a nuclear renaissance. EPAct 2005 was successful in giving the Nuclear Regulatory Commission the tools it will need to meet its challenges as we look to them to permit new nuclear facilities. EPAct also provided additional incentives such as loan guarantees, production tax credits and federal risk insurance for the builders of new plants. This new law also addresses the issue of security at our commercial nuclear facilities, giving the public the confidence that these sites are well protected. Mr. Chairman, I want to congratulate you and the full EPW Committee on your action to pass many of these important nuclear provisions.

The Nuclear Power 2010 program is focused on reducing the technical, regulatory and institutional barriers to deployment of new nuclear powerplants based on expert recommendations. The Nuclear Power 2010 Program is designed to work with the nuclear industry in a cost-shared arrangement to establish a market-driven, public-private effort to address the technical, regulatory and institutional challenges to new plant construction. The program's basic missions are to demonstrate the new Nuclear Regulatory Commission licensing processes, identify suitable sites for new plants, and certify state-of-the-art (or "Generation III+") designs for new nuclear powerplants. The goal of the Nuclear Power 2010 program is to facilitate an industry decision to build and operate at least one new advanced light-water reactor plant in the United States early in the next decade.

We are also committed to more effective international cooperation, which will produce strong benefits here at home. The Global Nuclear Energy Partnership (GNEP) seeks to develop worldwide consensus on enabling expanded use of economical, emission-free nuclear energy to meet growing electricity demand. By working with other nations under the Global Nuclear Energy Partnership, we can provide the less expensive, safe, clean energy that growing economies need, while ensuring nuclear nonproliferation. America will work with nations that have advanced civilian nuclear energy programs. GNEP will use new technologies that effectively and safely recycle spent nuclear fuel. Re-processing spent nuclear fuel for use in advanced reactors has the potential to significantly reduce storage requirements for nuclear waste. It will also allow us to extract more energy from fissile materials in spent fuel that would otherwise be sent directly to a geologic repository. Through our partnership, we can help developing countries meet their growing energy needs by providing them with small-scale reactors that will be secure and cost-effective. We will also help ensure that developing nations have a reliable nuclear fuel supply. In exchange, these countries would agree to use nuclear power only for civilian purposes and forego uranium enrichment and reprocessing activities that can be used to develop nuclear weapons.

Vehicles

We are also working to improve the way we power our transportation through improvements in vehicle fuel economy, greater availability and use of current and next generation renewable fuels, and ultimately through zero-emission hydrogen.

Corporate Average Fuel Economy (CAFE).—Since 2003, the Bush Administration has finalized two sets of Corporate Average Fuel Economy (CAFE) regulations requiring a combined 15 percent increase in the fuel economy of light trucks, including for the first time, large and very heavy Sport Utility Vehicles, such as the Hummer H2. The Administration's latest CAFE regulation reforms the structure of the program and implements improvements recommended by the National Research Council of the National Academy of Sciences that will not only help save fuel, but also lives and American jobs. These actions are projected to save more than 14 billion gallons of gasoline over the lifetime of these trucks, and correspondingly avoid over 100 million metric tons of carbon dioxide emissions. The President has strongly urged Congress to give us authority to establish new rules on passenger car fuel economy based on these concepts.

Tax Incentives for Efficient Vehicles.—The President proposed, and Congress enacted, tax incentives of up to $3,400 per vehicle to encourage purchase of highly efficient hybrid and clean diesel vehicles, which offer near-term potential to reduce demand for fuels made from crude oil. The President has called on Congress to reconsider certain limitations that EPAct placed on the availability of these tax credits to allow for their broadest use.

Renewable Ethanol and Biodiesel.—Biofuels can be produced either by the conversion of sugar, starch, or cellulosic feedstocks to ethanol, or by conversion of animal fats or soybean or other plant oils to produce biodiesel. These clean-burning fuels are currently either mixed with gasoline or diesel fuel in small amounts (up to 10 percent for ethanol and up to 20 percent for biodiesel) and used in conventional vehicles to help reduce petroleum demand, or in the case of ethanol, blended in larger amounts (up to 85 percent ethanol to make E85 fuel) and used in specifically-designed flexible-fuel vehicles (FFVs). In 2005, the 4 billion gallons of ethanol blended into gasoline amounted to about 3 percent by volume of all gasoline sold in the United States.

The EPAct 2005 established a renewable fuels standard to require the use of 7.5 billion gallons of renewable fuels such as ethanol and biodiesel by 2012. Because of higher crude oil prices, producer tax incentives, and the phasing out of MTBE, however, we are likely to exceed the EPAct's target by a significant margin. The EIA projects renewable demand in 2012 of 9.6 billion gallons for ethanol and 300 million gallons for biodiesel, assuming crude oil prices forecast at $47 per barrel.

Alternative Fuel Facilities.—The EPAct 2005 also provides a 30 percent tax credit for installation of alternative fuel stations, up to a maximum of $30,000 per year. Currently only about 700 public "E85" (85 percent ethanol) fueling stations exist in the United States. The increased availability of E85 will mean that more FFVs can use ethanol. Of the approximate five million FFVs on our roads today, most are currently fueled with conventional gasoline rather than E85, in part due to the limited availability of E85.

Cellulosic/Ethanol.—The President's goal is to make cellulosic ethanol cost-competitive by 2012, enabling greater use of this alternative fuel to help reduce future U.S. oil consumption. Virtually all domestically produced ethanol currently comes from corn. However, corn and other starches and sugars are only a small fraction of biomass that can be used to make ethanol. A recent DOE/USDA study, using aggressive technology and land use assumptions, suggests that the United States could produce or harvest biomass resources capable of being converted into 60 billion gallons of biofuels per year—30 percent of current U.S. gasoline consumption—in an environmentally responsible manner without affecting future food production. Although the study does not consider cost and sustainability, it provides an estimate of our significant biomass resource potential. To achieve greater use of "homegrown" renewable fuels, we will need advanced technologies that will allow competitively priced ethanol to be made from cellulosic biomass, such as agricultural and forestry residues, material in municipal solid waste, trees, and grasses. Advanced technology can break those cellulosic materials down into their component sugars and then ferment them to make fuel ethanol. To help reduce the costs of producing these advanced biofuels and ready these technologies for commercialization, the President's 2007 budget request increases DOE's biomass applied research funding by 65 percent, to a total of $150 million. In accordance with Section 932(d) of the EPAct, a Funding Opportunity Announcement was made by Secretary Bodman on February 22, 2006 for the commercial demonstration of integrated biorefineries. Total amount of these multi-year awards is $160 million (not including 60 percent cost-share). The

projects are currently in the review process with notification of 2–4 winners anticipated late in 2006.

Hydrogen Fuel Initiative.—In his 2003 State of the Union Address, President Bush launched the Hydrogen Fuel Initiative, which seeks to work in partnership with the private sector to accelerate the research and development required for a hydrogen economy. The President's Hydrogen Fuel Initiative and the FreedomCAR Partnership combined are providing nearly $1.7 billion over five years, from fiscal year 2004 to 2008, to develop hydrogen-powered fuel cells, hydrogen infrastructure technologies, and advanced automobile technologies. The President's Initiative will enable the commercialization of fuel cell vehicles in the 2020 timeframe. Through this initiative, the cost of a fuel cell has been cut in half, and the expected life of an automotive fuel cell has been doubled since 2003. I have driven several prototypes of such vehicles. Private sector interest and investment remains high.

Improve Air Quality and Public Health

Air pollution in the United States has declined by 53 percent since 1970. During the same time period, the economy increased by 195 percent, energy use increased by 48 percent and the population increased by 42 percent. Between 2000 and 2005 alone, U.S. air pollution declined by 12 percent. The success of declining emissions as the economy grows is due, in part, to the remarkable progress American innovators have had in developing and deploying emission control and efficiency technologies and practices. The President's clean air initiatives are designed to build on and significantly accelerate this progress, in both the power generation and transportation sectors.

Cleaner Power Generation—Both Old and New.—The Clean Air Interstate Rule (CAIR) will require powerplants in the eastern part of the United States to cut their emissions of sulfur-dioxide, nitrogen oxide and, for the first time, mercury by nearly 70 percent. Coupled with EPA's rule to decrease emissions from heavy-duty on-highway and non-road diesel engines, and other existing state and federal control programs, CAIR will help bring most of the country into attainment with more stringent ozone and $PM_{2.5}$ air quality standards. Attainment of the standards will provide room for economic growth as manufacturers seek permits to expand their operations and to build new facilities. The broadly distributed and relatively minimal impact these regulations will have on natural gas, coal and electricity prices will also provide economic advantage by achieving the environmental benefits in the most cost effective manner. By providing a clear, long-term, market-based regulatory framework, CAIR will help improve stability of electricity prices for consumers and manufacturers.

The President's Clear Skies legislation would improve on these outcomes by expanding the powerplant controls under CAIR nationwide. Clear Skies would cap emissions from more than 1,300 powerplants nationwide, reducing pollution by as much as 9 million tons annually at full implementation. Utilities will achieve this by spending more than $52 billion to install, operate and maintain new, primarily clean coal pollution abatement technology on both old and new powerplants. The Clear Skies legislated cap-and-trade program, using the same mechanism as the highly successful Acid Rain Trading Program, will require only a few dozen government officials to operate and will assure almost 100 percent compliance through a system that is easy to monitor and easy to enforce.

Cleaner Transportation.—The Administration is also implementing new rules regulating emissions from both highway and non-road diesel engines and fuels. The Ultra Low Sulfur Diesel rule will go into effect nationwide in October. This rule will dramatically reduce emissions from both highway and non-road diesel engines by more than 90 percent. Removing the sulfur from the fuel, paves the way for the Administration's new rules cutting nitrogen-oxide and particulate matter (PM) emissions by 90–95 percent from the diesel engines on new heavy duty trucks, school buses, and non-road vehicles such as construction and farm equipment, and ultimately certain ships and locomotives. This program will also reduce non-methane hydrocarbons (NMHC), sulfur dioxide (SO_2), carbon monoxide (CO) and air toxics emissions. These new rules are the result of an EPA-led collaborative process that had wide support from industry—fuel refiners and distributors, engine and equipment manufacturers—environmental groups and other stakeholders. Together these rules will make that familiar "black puff of smoke" a thing of the past.

The technological breakthrough of a new generation of clean diesel fuels and engines opens up a dramatic new opportunity for fuel savings and greenhouse gas reductions in the high volume and turnover market of passenger cars and light duty vehicles. In part because of stringent tailpipe pollution standards, only a very small percentage of passenger cars, SUVs, delivery vans and pickup trucks are diesel. By contrast, in Europe, with less stringent tailpipe standards and higher gasoline

prices, the percentage of diesel passenger and light duty vehicles is quite high. With the availability of new diesels than can meet our new clean air standards, even a modest increase in the diesel fleet percentage can produce enormous savings. Clean diesel engines reportedly are about 25 to 35 percent more fuel efficient than gasoline engines. These gains are achieved throughout the driving cycle, in contrast with hybrids which produce their gains primarily in city driving. Clean diesel engines also substantially reduce the amount of CO_2 per mile traveled. At the same time, clean diesels offer greater performance (especially pulling heavier loads), lower maintenance costs, longer engine life, and the capability to use biodiesel, a fuel that can be produced from a wide variety of biomass sources, without losing as much of the fuel economy benefit as ethanol does. That is why DOE has helped initiate an accelerated process to establish national and international bio-diesel fuel standards, which should further enable the design of high-performing and reliable clean diesel engines for both the U.S. market and global market.

Reduce Greenhouse Gas Intensity

Our Climate Approach.—The President is firmly committed to taking sensible action on climate change—at home and abroad. Climate change is a serious, long-term challenge that requires an effective, sustainable policy. The Administration's climate change policy is science-based, encourages research that leads to technological innovation that is cleaner and more efficient, and takes advantage of the power of markets to bring those breakthrough technologies into widespread use. Our inclusive strategy brings all stakeholders to the table and encourages meaningful global participation through actions that will reduce greenhouse gas emissions, improve energy security and cut air pollution that is harmful to human health and natural resources while ensuring continued economic growth and prosperity for our citizens and for citizens throughout the world. Economic growth enables investment in the technologies and practices we need to burn our vast reserves of coal more cleanly and efficiently and reduce our dependence on imported fossil fuels.

Progress Toward the President's Goal.—The President has set an ambitious target of cutting our greenhouse gas intensity by 18 percent through the year 2012. When announced, this commitment was estimated to achieve about 100 million additional metric tons of reduced carbon-equivalent emissions in 2012, with more than 500 million metric tons of carbon-equivalent emissions in cumulative savings over the decade. Our objective is to significantly slow the growth of greenhouse gas emissions and, as the science justifies, stop it and then reverse it. While measuring progress in absolute terms is important, the most useful measure for policy management purposes is the relative improvement in greenhouse gas emissions intensity—a point that our Asia-Pacific Partners recognize. The intensity measure appropriately recognizes reductions that are achieved through increased investment in efficiency, productivity and economically valuable outcomes that require less energy or otherwise lead to lower emissions. The intensity measure sharply discounts reductions produced by economic decline, job loss, or policies that simply shift greenhouse gas emitting activity from the United States to another country—in which case the desired emissions reduction did not actually happen.

To meet help our intensity target, further our understanding of climate science, and help reduce our emissions in the long-term, the Administration has committed more than $29 billion for climate change related activities since 2001, helping fund numerous related to climate change. The President's 2007 Budget includes an additional $6.5 billion for climate change related activities—an increase of 12 percent from the previous year. Because of this aggressive strategy, we are well on our way to meeting our target. According to EPA data reported to the UNFCCC, U.S. greenhouse gas intensity declined by 2 percent in 2003, and by 2.5 percent in 2004.[1] Put another way, from 2003 to 2004, the U.S. economy increased by 4.22 percent while greenhouse gas emissions increased by only 1.7 percent. This rate of progress exceeds the progress in most other major developed countries. A June 2006 EIA preliminary estimate of energy-related carbon dioxide emissions—which account for over four fifths of total greenhouse gas emissions—suggests an improvement in carbon dioxide emissions intensity of 3.3 percent in 2005.

Progress in the United States compares favorably with progress being made by other countries. Trends in GHG Emissions: 2000–2004 (Attachment 1) and Trends in GHG Emissions Intensity: 2000–2004 (Attachment 2) show how emission trends in the United States compare to other industrialized countries based on national data reported to the UN Framework Convention on Climate Change. The data in

[1] Using a slightly different methodology, the Energy Information Administration estimated improvement in greenhouse gas emission intensity of 1.6 percent and 2.1 percent in 2003 and 2004, respectively.

Attachment 1, which includes countries that have obligations under the Kyoto Protocol, indicate that from 2000 to 2004 the major developed economies of the world are at about the same place in terms of actual GHG emissions. In some countries, emissions are increasing slightly, in others they are decreasing slightly. Contrary to some popular misconceptions, no country is yet able to decrease its emissions massively. Note that the United States has seen its actual emissions increase by 1.3 percent, a lower percentage than the European Union 15 increase of 2.4 percent.

Trends in GHG Emissions Intensity: 2000–2004 shows progress in emissions intensity for the same countries over the same period. Major industrialized countries are all in the 10 percent range for emissions intensity improvement, showing that these economies, with very sophisticated infrastructure and systems, are in the process of turning over capital stock to more productive and efficient technologies and practices. The ongoing focus is to take actions to help accelerate that turnover to cleaner and more advanced technologies.

Our climate approach includes a broad array of strategies to bring cleaner energy technologies to the market. The Administration is now implementing numerous federal programs—including partnerships, consumer information campaigns, incentives, and mandatory regulations—that are directed at developing and deploying cleaner, more efficient energy technologies, conservation, biological sequestration, geological sequestration and adaptation. The President attaches great importance to creating incentives for our industries, companies, and citizens to take actions that will have a real impact on greenhouse gas emissions. For example, the DOE's Climate VISION program and the EPA's Climate Leaders and SmartWay Transport Partnership programs work in voluntary partnership with specific commitments by industry to verifiably reduce emissions. In terms of incentives, little attention has been paid in the climate change context to the massive benefits of the new, more favorable tax rules on expensing and dividends, which helping to unleash substantial new capital investment, including purchases of cleaner, more efficient equipment and facilities.

ASIA-PACIFIC PARTNERSHIP

Last January, the United States and our Asia-Pacific Partners announced that we would be better able to meet our increased energy needs and associated challenges, including those related to energy security, air pollution, and greenhouse gas intensity, by working together. We recognized that it is critical that we cooperate on developing, demonstrating, and implementing cleaner and lower emissions technologies that allow for the continued economic use of fossil fuels while addressing air pollution and greenhouse gas emissions. We are using the Partnership's platform to promote the deployment of promising technologies that offer greater energy efficiency and lower air pollution and greenhouse gas intensities. After reviewing the extensive range of existing national programs and projects our governments are pursuing with regard to clean development and climate, we recognized that together we can pool our resources and meet a range of diverse development and climate objectives simultaneously.

Emerging Economies.—The Asia-Pacific Partnership engages key emerging economies, particularly important in the context of climate change, even as they grapple with their more immediately pressing energy security and air quality efforts. The Energy Information Administration (EIA) is predicting that by 2010 energy-related carbon dioxide emissions from non-OECD emerging economies, including India and China, will exceed those produced by the mature OECD market economies of North America, Europe and Asia. By 2030, the EIA estimates that global carbon dioxide emissions will rise 60 percent compared to today's levels, with two-thirds of the increase driven by developing country emissions. (See Attachment 3: World Carbon Dioxide Emissions by Region: 2003–2030). These EIA projections are consistent with recent projections from the International Energy Agency. Its World Energy Outlook 2004 suggests that well over two thirds of the projected increase in energy-related carbon dioxide emissions between now and 2030 will be from developing countries. Absent the participation of all major emitters, including developing countries, the UN Framework Convention's ultimate goal of stabilizing greenhouse gas concentrations will remain elusive. By working together, however, EIA projections suggest that reasonably ambitious strategies to improve greenhouse gas intensity can produce meaningful progress in offsetting the accumulation of greenhouse gases. (See Attachment 4: Carbon Dioxide Intensity Improvement Projections).

The Asia-Pacific Partnership is a significant breakthrough. A successful international response to climate change requires active and meaningful 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.

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 expertise.

Nationally Defined Outcomes.—The Partnership will work within the context of nationally defined outcomes to identify needed methods, technologies, and financial arrangements to assure success. The Asia-Pacific Partners, for example, will share their experiences with China to assist its government, wherever possible, in meeting its commitment to improve its energy intensity by 20 percent and cut its sulfur-dioxide emissions by 10 percent by 2010 from 2005 levels. For our part, we have much to gain from the Partnership as well. For instance, we are learning from Japan, which has a highly-evolved, partnership program of greenhouse gas mitigation goal-setting and implementation involving each of its major emitting sectors. DOE's Climate VISION and EPA's Climate Leaders programs share common elements with the Japanese program, and closer alignment and amplification of these approaches, while ensuring their relevance to each country's national circumstances, will be very valuable.

Industrial and Commercial Private Sector Involvement.—The Asia-Pacific Partners recognize that working closely with private sector and other stakeholders is crucial to our success in addressing energy and climate issues. And the private sector has recognized the potential that the Asia-Pacific Partnership brings to their businesses. Senior executive leadership of some our Nation's most successful businesses are actively engaged in the Partnership. Personal time and focus are among the most valuable commodities that a CEO can give any venture. CEOs do not get personally involved unless they believe there is a real potential for tremendous success, and they are very involved in the Partnership. The fact that several CEOs and other senior executives have made multiple trips to Asia to participate in Partnership meetings strongly demonstrates enthusiastic private sector engagement about the Partnership's value. Success for the private sector translates into energy security, cleaner air and reduced greenhouse emission.

The U.S. 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 effectively plugged into the Partnership at every stage of its work. Government-to-government discussions held under the auspices of the Partnership bring together economic, energy, and environment ministries which enable the governments to build a more effective and sustainable effort to tackle climate change.

Leveraged Outcomes.—The Partnership enables public and private entities to do what they do best. Government to government action is focused on addressing barriers and making it easier to address market opportunities and potential projects. The private sector then delivers on energy efficient pollution and greenhouse gas emissions reduction projects that create jobs in the United States, a policy preferable to direct subsidies which burden our taxpayers with these expenses. In other words, $50 million of U.S. taxpayer money can be leveraged into billions of dollars of private sector investment instead of just producing one project worth $50 million. What this means in environmental terms is that for the cost of one moderate sized clean energy project, one could see a reduction in emissions from hundreds of new energy efficient projects. 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.

A recent methane capture agreement in China represents an environmentally conscious and profitable deal. Methane gas is released into mines or the atmosphere during coal mining operations. It can be very hazardous and can contribute to fires and explosions if not properly vented. Methane is also a greenhouse gas over 20 times more potent than carbon dioxide. It can also be used as a clean burning fuel. Methane capture during coal mining operations nets significant benefits in terms of worker safety, reduction of harmful pollution, and mitigation of greenhouse gas. It is a well-established and highly profitable practice now in place at 21 mines in the United States. In 2003, U.S. mines with methane drainage systems in place produced about 56 billion cubic feet of methane (22.62 $MMTCO_2E$). About 40 billion cubic feet of the drained gas, or 71 percent, was recovered and utilized for energy. To date, the majority of coal mine methane recovered in the United Staets has been

injected into natural gas pipelines. However, with higher energy prices in recent years, other options such as electric power generation for on-site use are becoming more viable. Two power generation projects are currently operating at active U.S. underground coal mines: CONSOL Energy in Virginia (88 MW) and Peabody Coal/NW Fuels Development in West Virginia (1.35 MW).

Under the auspices of the multilateral Methane to Markets Partnership, a precursor to the Asia-Pacific Partnership, Caterpillar and Shanxi Jincheng Anthracite Coal Mining Group Co., Ltd. in China signed a $58 million contract to provide 60 methane-gas-powered generator sets to produce power at a Chinese coal mine. Once complete, this project is expected to be the largest of its kind in the world. Caterpillar will be capturing methane gas, instead of venting it into the atmosphere, and burning it to provide 120 megawatts of electricity to Jincheng City. It is estimated that the project will reduce greenhouse gases by 4.0 million tons of carbon dioxide equivalent over its 20-year lifetime. This is an example of the type of initiative that the Asia-Pacific Partnership is trying to duplicate. The potential number of projects similar to this in other Partner countries is quite high.

STRUCTURE AND TASK FORCES

I will now summarize the Partnership's technical structure, the nature of the results it can produce, and the path forward. 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 Minister John Howard and chaired by Australian Foreign Minister Alexander Downer. In addition to involving high-ranking government official representation, the meeting also included a substantive dialogue with heads of industrial organizations from each country representing some of the most significant, energy-intensive and emitting sectors.

The Ministers agreed to a Partnership Communiqué, Charter, and Work Plan, which I have attached to my testimony. Concurrently, they established a Policy and Implementation Committee and the Partnership's 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, and Buildings and Appliances.

The Policy and Implementation Committee (PIC) sets the overall policy direction and outreach strategy for the Partnership. It also serves as the mechanism for introduction of new projects and participants in Partnership. Since the Partnership is heavily reliant upon a "bottom up" approach, the PIC relies on the eight Task Forces as the foundation for its strategic planning.

Each Task Force has a government chair and co-chair (See Attachment 5). Initial details about the objectives and work plans for each Task Force are outlined in the accompanying charts. Each Task Force consists 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 U.S. is chairing the Policy and Implementation Committee and chairing or co-chairing three of the Task Forces. The U.S. Task Force members include participants from government agencies, major companies, trade associations, and non-profit organizations.

In April of this year, the U.S. hosted the first Task Force working meetings in Berkeley, California. Approximately 300 senior representatives from the public and private sectors attended the nearly week-long event. The eight Task Forces met for two full days and identified actions covering several dozen activities.

All eight Task Forces have drafted Action Plans, documents that describe objectives and initial project ideas. The Policy and Implementation Committee is reviewing the Action Plans now.

The Policy and Implementation Committee is meeting from October 11th to 13th in Jeju, South Korea. Participants will focus on:

- Coordinating the reporting projects in the Task Force Action Plans;
- Developing guidance on a mechanism for introducing new projects to the work program;
- Communicating with and reaching out to the private sector;
- Discussing how to more fully utilize the technology and the internet for project coordination and outreach;
- Recommending "flagship" projects from current lists of projects; and
- Providing an opportunity for participating countries to discuss expanded participation by other Pacific Rim nations.

The eight Asia-Pacific Partnership Task Forces are making progress in advancing the Partnership's goals. In the following paragraphs I summarize each Task Force's

goals and objectives, and potential projects. The names of the lead Federal agency or agencies appear next to the Task Force names.

Aluminum (U.S. Co-Chair; DOC, EPA).—The Aluminum Task Force seeks to: advance the development and deployment of new aluminum production using "best practice" processes and technologies; enhance sector-related data, including recycling and performance; and facilitate increased aluminum recycling rates across the Partnership economies. The Aluminum Task Force has seven projects outlined in support of these goals.

In its proposed flagship project, the Task Force will advance the management of perfluorocarbon (PFC) emissions in primary aluminum smelters. Reduction in PFC emissions would substantially reduce the global contribution of greenhouse gas emissions. PFCs are potent greenhouse gases with a very long atmospheric lifespan. Under the U.S. EPA Voluntary Aluminum Industrial Partnership (VAIP), and under the expanded efforts of the more recent Climate Vision agreement, the U.S.' primary aluminum industry has reduced PFC emission intensity by about 77 percent, from 1.31 tons of carbon equivalent emissions per ton of production in 1990 to 0.3 tons per ton of production in 2004. The PFC management project under the Asia-Pacific Partnership seeks to transfer this progress to the other Partner countries. Initial workshops have been held in Beijing, and a training workshop is under development for 2007 in India. Given that China is now the world's largest aluminum producer, and India is rapidly expanding its production, this project has a large potential to reduce current and future aluminum smelting greenhouse gas emissions.

Buildings and Appliances (U.S. Co-Chair; DOE, EPA).—The Buildings and Appliances Task Force seeks to increase levels of private investment in energy efficient buildings and appliances in support of broader national efforts that support sustainable development, increase energy security, and reduce environmental impacts. The Task Force is using existing tools, such as Memoranda of Understanding and bilateral agreements, to expand cooperation and collaboration. It is developing and employing new tools, such as best practice guidelines and market transformation strategies, to increase the energy efficiency of buildings and appliances in Partner countries. Members of the Task Force believe that abundant opportunities exist to do so cost-effectively, and have agreed to: cooperate in the development of demonstration technologies, advance building design principles that increase energy efficiency; and identify barriers to the implementation of energy efficient practices and technologies.

Through the Buildings and Appliances Task Force, the U.S. is working with the Chinese government and private companies to implement no-cost or low-cost practices and cost-effective retrofits that can reduce energy use by as much a 15 percent. EPA's eeBuildings program, which shares the lessons learned from Energy Star, launched a major new partnership with Savills, a premier property services firm with 14,500 employees worldwide. Savills has offices in six key Chinese cities and manages over 90 large buildings in China. Through this collaborative venture, EPA will train several hundred Savills building managers, provide input for a new portfolio management system, and grant technical assistance to improve the operations of 85 government-owned buildings.

Cement (EPA).—The Cement Task Force is developing energy efficiency and emission reduction benchmarks to allow for standardized measurement of the energy and environmental performance of participating countries' cement sectors. This is an important policy tool to set voluntary energy efficiency targets and evaluate progress. The Task Force uses this information to help prioritize investments in energy efficient technologies. The Cement Task Force will also analyse the legal frameworks in the Asia-Pacific Partnership nations and identify incentives for and barriers to implementing energy efficient and clean manufacturing technology.

The Asian Development Bank (ADB) is working with EPA to conduct pilot projects in China to quantify energy cost savings and pollution and carbon dioxide reductions resulting from the installation of clean technology, and identify finance mechanisms for promoting private sector investments in clean technology in China. A conference is scheduled to take place in Beijing on September 26, 2006 to engage key ministries. ADB is poised to extend the project to other Partnership countries if it is successful in China. Cement production plays a significant role in the rapidly expanding economies of China and India. This initiative holds great potential to improve the energy efficiency of and reduce emissions from China's cement production.

Cleaner Fossil Energy (DOE, EPA).—The Cleaner Fossil Energy Task Force seeks to accelerate the demonstration and deployment of cleaner fossil energy technologies in Partnership countries by: building capacity and expertise to support cleaner technology development; identifying and addressing barriers to expansion of cleaner fossil energy technologies including technical barriers, site approvals and licensing con-

straints, infrastructure limitations, and inter-country market structures; and assessing and promoting CO_2 capture and storage opportunities.

Earlier this month, the Japan Coal Energy Center (JCoal) and the European Parliaments Research Initiative co-sponsored a workshop in Tokyo on Integrated Gasification Combined Cycle (IGCC) clean coal technology and Carbon Capture and Storage. All six Asia-Pacific Partnership countries sent representatives to this event.

India and South Korea have recently joined the FutureGen Initiative, a $1 billion, 10-year long, public-private partnership to build the world's first coal-based, near-zero emissions electricity and hydrogen powerplant. It is designed to dramatically reduce air pollution and capture and store greenhouse gas emissions through carbon sequestration. The two countries have each pledged $10 million; the member companies have collectively committed $250 million including international companies in Australia and China.

Coal Mining (U.S. Chair; DOE, DOI).—The Coal Mining Task Force seeks to: meet the increasing energy demand using sustainable coal mining practices; ensure an adequate, competent workforce; accelerate the deployment of technologies and practices that can improve resource recovery, including coal mine methane; and improve the economics and efficiencies of coal mining, reclamation, and coal processing while continuing to improve mine safety and reduce environmental impacts.

The U.S. is playing a large role in the Task Force's submissions to Australia's "Leading Practice Sustainable Development Program for the Mining Industry" project, which is publishing four volumes on best practices in coal mining. The first of four books will be completed by the end of the year. The U.S. delegation added content from a newly published book on "Managing Coal Combustion Residues in Mines" by the National Research Council of the National Academies 2006 to this program.

The Methane to Markets Partnership is another highly practical major element in the Bush Administration's series of international technology partnerships. Launched in November 2004, the Methane to Markets Partnership focuses on advancing cost-effective, near-term methane recovery and use as a clean energy source from coal mines, oil and natural gas facilities, landfills, and agricultural waste management systems. The Methane to Markets Partnership, in coordination with the Asia-Pacific Partnership, will hold a coal mine methane development workshop in Brisbane, Australia on October 4th and 5th. The workshop will address opportunities and impediments to coal mine methane project development by focusing on case studies and experiences in Australia, the United States, and internationally. A Coal Mine Subcommittee meeting will follow on October 6th. The Asia-Pacific Partnership builds upon the principles of Methane to Markets and is actively leveraging its resources in the interagency process.

The Coal Mining Task Force will hold a mine safety workshop in Washington, DC this fall. The Australian delegation will assist. Planning is now underway, with National Mining Association taking the lead.

Power Generation (U.S. Chair; DOC, DOE).—The Power Generation and Transmission Task Force seeks to significantly improve the efficiency and environmental performance of power generation, transmission and distribution, and end use. The Task Force will assess opportunities for practical actions to develop and deploy power generation, transmission and demand side management technologies that can aid development and mitigate climate concerns. The Task Force is also facilitating the deployment of practices, technologies and processes to improve efficiency of power production and transmission. We have demonstrated that simple and inexpensive improvements in Indian powerplants can increase efficiency by more than 1.5 percent. Replicating these improvements at over 130 small coal powerplants could reduce India's CO_2 emissions by over 100 million tons/year and reduce fuel costs by over $150 million/year. Communicating efficient practices and sharing knowledge is a cornerstone of the Power Generation Task Force's Action Plan. Plans are in place through the Partnership to engage Indian officials and engineers.

Over 20 U.S. utilities have agreed to engage the Partnership. Under the auspices of the Partnership, the American Electric Power Corporation (AEP) hosted representatives from the Indian National Thermal Power Corporation, the largest power utility in India, where senior Indian officials and engineers observed opportunities for efficiency and environmental improvements. As a follow-up, this September, AEP and other U.S. companies are planning to host meetings and plant visits to share "best-practices" on techniques and processes to operate power facilities more efficiently and to control emissions. A parallel track co-hosted by AEP, Southern Company, and Tampa Electric Company will allow participants to examine and discuss advanced Integrated Gasification Combined Cycle (IGCC) technologies. Over 100 participating engineers representing all Asia-Pacific Partnership member countries are expected to attend. This event will be the first in a series of events focused

on Identification and Implementation of Applicable Best Practices for Power Generation. Both government and industry in China and India have shown strong interest in the return visit and plan to send engineers to participate.

Renewable Energy and Distributed Generation (DOC, DOE).—The Renewable Energy and Distributed Generation Task Force is focused on taking concrete actions to achieve real, measurable outcomes toward the accelerated deployment of renewable energy over the next five years. Members of the Task Forces recognize they must close the remaining gap between the cost of renewable energy and conventional generation.

U.S. Commercial Service (CS) trade specialists from New Delhi and the East Asia Pacific region have organized a reverse trade mission from India to Chicago, California, and Washington, DC for August 5th to 16th. The delegation, consisting of 16 Indian business and government decision-makers in the renewable energy and energy efficiency sectors first attended the U.S. Department of Energy-sponsored Energy 2006 conference in Chicago where CS organized 45 one-on-one meetings with representatives from U.S. renewable energy product manufacturers. In California, the delegation met with local municipalities, regional authorities, and private companies involved with the industry, with whom the delegation members had another 130 one-on-one meetings. Preliminary results of the mission already show projected U.S. exports in the short term of biomass, biodiesel, combined heat and power, bioplasma technology, photovoltaic solar panels, inverters, and financial services worth almost $12 million.

Steel (DOC, DOE).—The Steel Task Force is developing a plan for sector-relevant benchmark and performance indicators. The Task Force's plan will include new developments in steel production and the transfer of these developments along with current state-of-the-art "best practices" in steel technologies. The Task Force will also encourage and increase recycling across the Partnership.

For the first time the steel industries in China and India are cooperating on new technologies and processes that will make their steel production cleaner and more energy efficient. Both China and India are significantly increasing steel production to support their rapid construction. China is projecting that their steel production will soon be approximately four times the steel production of the United States. By implementing new technologies and best practices used in Japan, Australia, and the United States, the new production in South Korea, India and China will be much cleaner, more energy efficient, and have lower greenhouse gas emissions.

CROSS-CUTTING POLICY NEEDS

The Asia-Pacific Partnership provides a framework for tackling policy issues that can advance the objectives of all or a group of the Task Forces. For example, most of the Task Force Action Plans will include an emphasis on energy conservation, improved energy efficiency and air pollution control. Partnership countries account for roughly 50 percent of global trade in these goods. However, each country currently imposes tariffs that impede diffusion of many technologies, goods and services to advance these objectives. Where imports occur, the tariffs make the products more expensive, cutting into efforts to make such technologies more widely available. Possible inconsistent application by some of our Partners may further obstruct the transfer of the best of currently available technology by creating an opaque process for exporters and increases transaction costs for their customers.

By eliminating these tariff barriers and leveling the playing field for all vendors, we will encourage the flow of more energy efficient and cleaner technology. For example, given the long life span of powerplants, deploying the best efficiency technology upfront ensures that we enjoy the greatest possible amount of reductions in energy demand, air pollution, and greenhouse gas emissions. At the outset of the Doha Round of World Trade Organization negotiations and during the World Summit on Sustainable Development in Johannesburg, South Africa in 2002, world leaders recognized this issue and committed to address it. The Asia-Pacific Partnership should provide leadership in eliminating tariffs and other trade barriers for these technologies.

FUNDING

As I mentioned earlier, the Partnership is a team effort and requires a team budget. The President's FY'07 budget calls for $52 million to support the work of the Partnership. The Partnership is a key means of implementing Title XVI of the recently enacted Energy Policy Act of 2005. 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 following represents a brief description of the areas of work each agency is undertaking:

State Department: $30 million

- Fossil fuel thermal powerplant operational improvements and technology retrofits
- Hydropower and other renewable energy technology deployment
- Cleaner energy technology deployment in rural areas
- Industrial and mining sector strategic planning, efficiency and emission intensity reductions
- Efficiency and emission improvement in rail transport, aviation and urban public transportation
- Policy and institutional development
- Administrative support for technical meetings, conferences, and public communication

Department of Energy: $15 million

- Advanced clean coal technology research and development
- Industrial technology strategic planning and energy efficiency best practices
- Energy efficiency best practices for public and private buildings

The EPA: $5 million

- Enhanced methane recovery
- Data development for emissions inventories and modeling
- Appliance energy efficiency labeling and energy efficiency best practices for buildings

Department of Commerce: $2 million

- Expanded export promotion for cleaner energy technologies
- Identification of barriers to deployment of clean energy technologies
- Assessment of existing standards related to clean energy and energy efficient technologies

In addition to U.S. funding, the Government of Australia has announced that it will contribute 100 million AUD (approximately $75 million U.S.) to the Partnership over 5 years. Discussions are underway regarding financial support from other partners.

CONCLUSION

The President and his Administration are firmly committed to improving economic and energy security, alleviating poverty, improving human health, reducing harmful air pollution, and reducing the growth of greenhouse gas emissions levels. The Administration has advanced policies that encourage research breakthroughs that lead to technological innovation, and take advantage of the power of markets to bring those technologies into widespread use. Our growth-oriented strategy encourages meaningful global participation through actions that will help ensure the continued economic growth and prosperity for our citizens and for citizens throughout the world. Economic growth enables investment in the technologies and practices we need to address these important issues.

Mr. Chairman and Members of the committee, I look forward to continuing to work with you on this innovative new effort to accelerate the development and deployment of clean energy technologies. Thank you for the opportunity to testify. I look forward to answering any questions you may have.

STATEMENTS BY THE PRESIDENT AND ADMINISTRATION OFFICIALS

The President

"The United States has joined with Australia, China, India, Japan, and South Korea to create a new Asia-Pacific partnership on clean development, energy security, and climate change. 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 six Asia-Pacific partners will build on our strong history of common approaches and demonstrated cooperation on clean energy technologies. I have directed Secretary of State Condoleezza Rice and Secretary of Energy Sam Bodman to meet with their counterparts this fall to carry forward our new partnership and provide direction for our joint work."

The President
"President's Statement on U.S. Joining
New Asia-Pacific Partnership"
July 27, 2005

"[L]ast month, I joined with the leaders of India and China and Australia and Japan and South Korea to create a new Asia Pacific Partnership on Clean Development. This is an innovative program which is authorized by this energy bill. And through it, our goal is to spread the use of clean, efficient energy technologies throughout the Pacific Rim."

The President
"President Signs Energy Policy Act"
August 8, 2005

"[T]he United States and India are working together to improve human health and the environment, and address the issue of climate change. So we've joined together to create the Asia-Pacific Partnership on Clean Development and Climate. Together with Australia and China and Japan and South Korea, we will focus on practical ways to make the best practices and latest energy technologies available to all -- things like -- technologies like zero-emission coal-fired plants. As nations across the region adopt these practices and technologies, they will make their factories and power plants cleaner and more efficient. We look forward to being an active partner in this partnership."

The President
"President Addresses Asia Society,
Discusses India and Pakistan"
February 22, 2006

"Our two nations [The United States and Australia] accept other global responsibilities, as well. We helped to build the Asia Pacific Partnership on Clean Development and Climate so we can make the latest energy technologies available to all to increase efficiency and reduce pollution."

The President
"President Bush Welcomes Prime Minister Howard of Australia in Arrival Ceremony at the White House"
May 16, 2006

National Security Advisor

"We established the Asia Pacific Partnership on Clean Development and Climate that is focusing on practical ways to make best practices and the latest energy technologies available to all of the countries."

National Security Advisor Hadley
April 5, 2006

"The Asia-Pacific Partnership on Development and Climate is a group of states working to enhance energy security, reduce poverty, and lower pollution levels through accelerated development of clean technologies."

National Security Advisor Hadley
March 16, 2006

Secretary of State

"We are here today to advance the Asia-Pacific Partnership on Clean Development and Climate. This is a multilateral public-private partnership to enhance energy security, to promote economic growth and to reduce greenhouse gasses. As the President emphasized in his State of the Union Address, this Administration is committed to developing cleaner and more secure sources of energy. This is essential for powering our nation's economy and for preserving our environment.

The Asia-Pacific Partnership is an important part of this commitment. The United States has joined with Australia, China, India, Japan and the Republic of Korea to take real action to achieve our shared development and climate objectives. Through our partnership we seek to move beyond divisive politics and to advance common purposes. Everyone has something to contribute. Everyone stands to gain. And together we represent a powerful force for positive change.

Our CEO partners are global leaders in the energy sectors, which account of a majority of the world's industrial production and power generation. Your contributions are crucial to the success of our partnership. By deploying your best technologies and practices, we will lower the cost of production, we will reduce air pollution and greenhouse gas emissions, and we will develop and bring to the marketplace the next generation of technologies to enhance our energy security and our national security.

Our five partners in government are also critical to this initiative, as they represent some of our world's most vibrant economies and some of our world's most influential nations.

Our partnership will require a sustained commitment from all of us and we in the United States plan to meet our responsibilities. In the fiscal year 2007 Budget that he has just released, President Bush is proposing $52 million to support the work of the Asia-Pacific Partnership with plans to continue strong support for the partnership in years to come. I'm delighted that we here at the State Department will coordinate this effort and I want to thank Under Secretary Dobriansky for her efforts in this regard. We look forward to working with our partners in Congress, particularly Senators Pryor and Hagel to realize our clean development goals.

These two men, these senators, are driving efforts on Capitol Hill to promote a healthier environment through cleaner technologies. The Asia-Pacific Partnership is an ideal framework for advancing the 2005 Energy Policy Act and for strengthening the President's approach of addressing climate objectives in the broader context of sustainable development and energy security.

Working together we have the capacity and the real opportunity to move the international community toward better, cleaner development, toward continued economic growth and job creation and toward a healthier and more secure future for all of our citizens. Thank you."

Secretary Rice
February 9, 2006

Administrator of the Environmental Protection Agency

"I would like to highlight a particularly important point of cooperation between China and the United States. We are each a founding member of the Asia-Pacific Partnership on Clean Development and Climate. This multilateral public-private partnership is precisely the type of initiative that will help China achieve its goals under your new five-year plan – by enhancing energy security, promoting economic growth, and reducing greenhouse gasses. Likewise, President Bush has committed our nation to developing cleaner and more secure sources of energy, in order to power our economy and protect public health.

But the Asia-Pacific Partnership is not just an initiative of governments. The companies who are members of this Partnership account for a majority of the world's industrial production and power generation. The strength of our partners in industry provide the Asia-Pacific Partnership with a greater ability to design and implement programs that will achieve our collective goals related to energy security, economic growth, and the reduction of greenhouse gases.

Many of America's domestic environmental protection programs are premised on the same foundation as the Asia Pacific Partnership. It is a notion that has underpinned environmental programs in the U.S. for over three decades: that economic growth and a clean environment go hand-in-hand."

Administrator Johnson
April 11, 2006

Secretary of Energy

"I'm pleased to announce today that President Bush will request $52 million in his upcoming FY 2007 budget to support the activities of the APP. This funding request will complement the $3 billion the U.S. spends each year on climate change technology solutions and the billions of dollars being invested by the U.S. private sector to increase efficiency and reduce emissions through voluntary programs like Climate Vision."

Secretary Bodman
January 12, 2006

Secretary of Commerce

"We all want to see greater stability and trust in the relationship between China and the United States. The Asian Pacific Partnership--an initiative to promote clean development and cooperation on energy and environmental issues--is a great example of what we can accomplish by working together."

Secretary Gutierrez
March 14, 2006

"The President's FY 2007 Budget requests $409 million for ITA to serve its goals along with an increase of $2 million to support the President's Asia-Pacific Partnership on Clean Development and Climate. This partnership will reduce the barriers to energy efficient American products and technologies in Australia, China, India, Japan and South Korea."

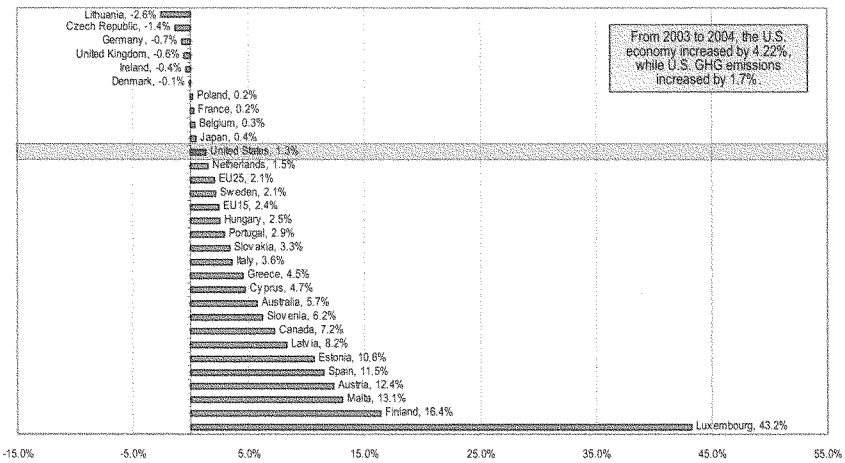
Department of Commerce
Press Release
February 6, 2006

ATTACHMENTS

Attachment 1: Trends in GHG Emissions: 2000-2004

ATTACHMENT 1

Trends in GHG Emissions: 2000-2004

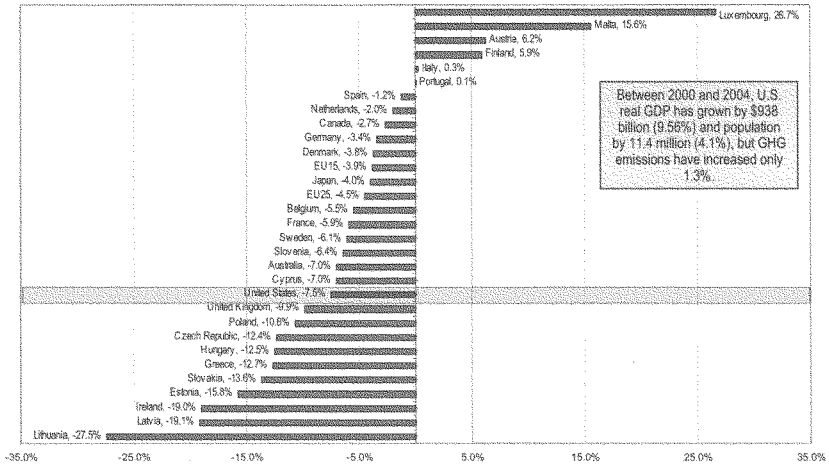


Emissions Data: 2006 National Inventory Reports and Common Reporting Formats at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/2715.php

Attachment 2: Trends in GHG Emissions Intensity: 2000-2004

ATTACHMENT 2

Trends in GHG Emissions Intensity: 2000-2004

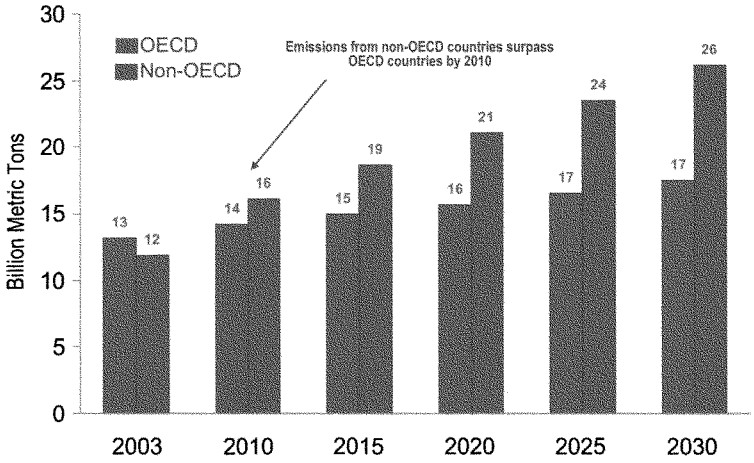


Emissions Data: 2006 National Inventory Reports and Common Reporting Formats at http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3734.php
Economic Data: Haber; These calculations are based on changes in Chained Real GDP. Since the chart is based on percent change, there should be little substantive difference from calculations using other measures of GDP such as those based on Purchase Power Parity. Since there is less controversy in using Chained Real GDP, these are the figures presented.

Attachment 3: World Carbon Dioxide Emissions by Region: 2003-2030

ATTACHMENT 3

World Carbon Dioxide Emissions by Region: 2003-2030



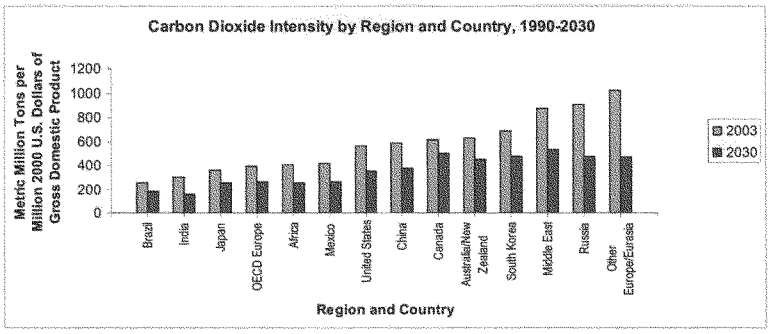
Source: Energy Information Administration, International Energy Outlook, 2006

Attachment 4: Carbon Dioxide Intensity Improvement Projections

ATTACHMENT 4

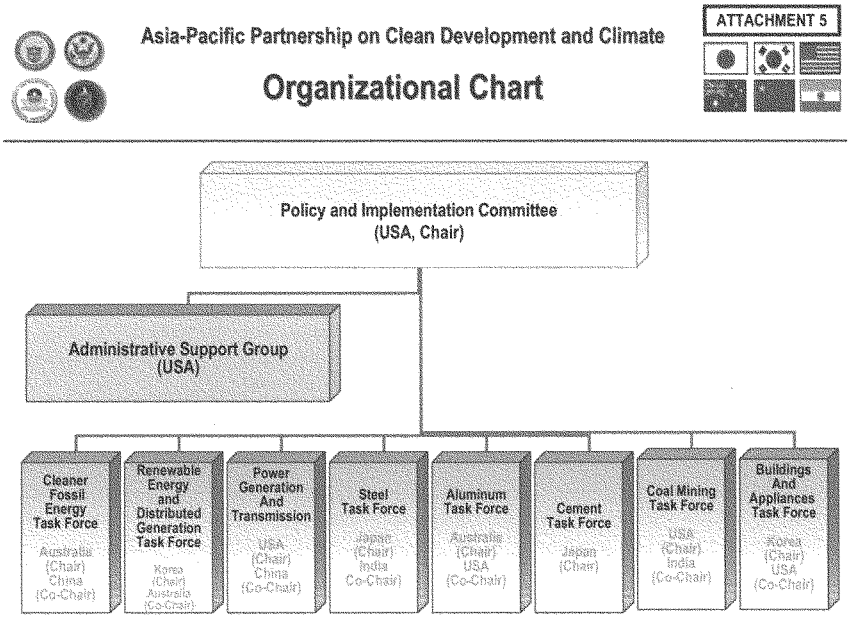
Carbon Dioxide Intensity Improvement Projections by Selected Countries and Regions

(Metric Tons per Million 2000 U.S. Dollars of Gross Domestic Product)



Source: International Energy Outlook 2006, Energy Information Administration, Department of Energy

Attachment 5: Asia-Pacific Partnership Organizational Chart



Asia-Pacific Partnership
on Clean Development and Climate
Inaugural Ministerial Meeting
Sydney, 11-12 January 2006

Communiqué

We met at Sydney for our first Ministerial meeting of the Asia-Pacific Partnership on Clean Development and Climate on 11-12 January 2006.

We adopted a Charter that sets out a framework to implement the Vision Statement of the Partnership announced in Vientiane on 28 July 2005. At the core of this vision is our conviction of the urgent need to pursue development and poverty eradication. By working together we will be better able to meet our increased energy needs and associated challenges, including those related to air pollution, energy security, and greenhouse gas intensity.

Our energy needs are growing rapidly, and will necessitate large-scale investments in the coming decades. We recognised that renewable energy and nuclear power will represent an increasing share of global energy supply. We recognised that fossil fuels underpin our economies, and will be an enduring reality for our lifetimes and beyond. It is therefore critical that we work together to develop, demonstrate and implement cleaner and lower emissions technologies that allow for the continued economic use of fossil fuels while addressing air pollution and greenhouse gas emissions. We undertook through this Partnership to cooperatively promote the deployment of promising technologies that offer greater energy efficiency and lower air pollution and greenhouse gas intensities.

Energy security is another major concern. Access to a diverse range of reliable and affordable energy sources underpins economic development and improved living standards and is a major determinant of energy security. Thus, our efforts to reduce the greenhouse gas intensity of a wide range of fossil fuels provide an important energy security benefit to us all.

We view climate change in particular as a serious problem that warrants a long-term commitment to substantive action. The Partnership will be consistent with and contribute to our efforts under the United Nations Framework Convention on Climate Change and will complement, but not replace, the Kyoto Protocol.

We reviewed the extensive range of existing national programmes and projects our Governments are pursuing with regard to clean development and climate. Each Partner will bring significant value to the Partnership and our Governments have pledged a serious commitment to Partnership projects and activities. We view the private sector as critical to this effort, and we will marshall considerable financial, human and other resources both from the public and private sectors. The Partnership aims to mobilise domestic and foreign investment into clean and low emission technology by fostering the best possible enabling environments.

We prepared the Partnership Work Plan, which explores a new approach for harnessing the power of our private sectors, our research communities and our government sectors to drive sustainable development. We will bring together the key experts from the public, private and research sectors of our economies to tackle these matters. We will also share experiences on related matters, such as workplace safety and technologies that help ensure the safety and well-being of our peoples.

Our Work Plan focuses on power generation and key industry sectors of our economies. We established eight public-private sector Task Forces covering (1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminium; (6) cement; (7) coal mining; and (8) buildings and appliances.

We have directed the Task Forces to drive improvements with regard to best practices and ensure that a range of technologies is developed and repeatedly demonstrated so that scale is increased and costs are reduced.

In this regard we have asked each Task Force to:

- review the current status within their thematic area with regard to clean development and climate,
- share knowledge, experience and good practices of how efficiency can be improved,
- systematically roadmap, where appropriate, relevant existing and emerging technologies, and
- develop an action plan that identifies specific opportunities for co-operation, and wherever possible, ambitious and realistic goals.

The Partnership Work Plan will be dynamic, evolving as the Task Forces elaborate their work.

Initially the Partnership chose to focus on a number of specific areas. The vision statement also detailed a rich array of other sectors, such as transport, where we will explore co-operation as the Partnership develops. There are also cross-cutting opportunities to advance clean development and climate beyond the current Task Forces, such as skills exchange. In this regard, we will positively consider the proposal to establish an "Asia-Pacific Energy Technology Co-operation Centre", to focus on the development and implementation of an energy audit program and its follow-up projects. We envisage that future meetings will address these other sectors of interest and cross-cutting matters as well as provide a forum for sharing experiences in developing and implementing our sustainable development and energy strategies.

The Partnership brings together a grouping of key nations to address the serious and long-term challenges of climate change, energy security and air pollution in ways that support sustainable economic development. Working together, we can make a significant contribution to global clean development and climate.

Asia-Pacific Partnership on Clean Development and Climate

Inaugural Ministerial Meeting
Sydney, 11-12 January 2006

Charter for the Asia-Pacific Partnership on Clean Development and Climate

We, the representatives of the national governments of Australia, China, India, Japan, the Republic of Korea, and the United States of America (collectively referred to as the "Partners"), meeting in Sydney, Australia on 12 January 2006:

Guided by our Vision Statement for a New Asia-Pacific Partnership on Clean Development and Climate of 28 July 2005 (Annex I), which is an integral part of this Charter;

Bearing in mind that the purposes of the Partnership are consistent with the principles of the United Nations Framework Convention on Climate Change and other relevant international instruments, and are intended to complement but not replace the Kyoto Protocol;

Decide to create the Asia-Pacific Partnership on Clean Development and Climate (referred to as the "Partnership") and set forth the following non-legally binding Charter for the Partnership. This Partnership will serve as a framework for supporting agile, constructive, and productive international cooperation among the Partners to meet our development, energy, environment, and climate change objectives.

1 Shared Vision

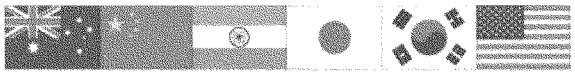
1.1 The Partners have come together voluntarily to advance clean development and climate objectives, recognizing that development and poverty eradication are urgent and overriding goals internationally. By building on the foundation of existing bilateral and multilateral initiatives, the Partners will enhance cooperation to meet both our increased energy needs and associated challenges, including those related to air pollution, energy security, and greenhouse gas intensities, in accordance with national circumstances. The Partners recognize that national efforts will also be important in meeting the Partnership's shared vision.

2 Purposes

2.1 The purposes of the Partnership are to:

2.1.1 Create a voluntary, non-legally binding framework for international cooperation to facilitate the development, diffusion, deployment, and transfer of existing, emerging and longer term cost- effective, cleaner, more efficient technologies and practices among the Partners through concrete and substantial cooperation so as to achieve practical results;

2.1.2 Promote and create enabling environments to assist in such efforts;



2.1.3 Facilitate attainment of our respective national pollution reduction, energy security and climate change objectives; and

2.1.4 Provide a forum for exploring the Partners' respective policy approaches relevant to addressing interlinked development, energy, environment, and climate change issues within the context of clean development goals, and for sharing experiences in developing and implementing respective national development and energy strategies.

3 Functions

3.1 Through this Partnership, the Partners are to cooperate to:

3.1.1 Exchange information on Partners' respective policy approaches relevant to addressing interlinked development, energy, environment, and climate change issues within the context of clean development, including any gaps and overlaps in national policy approaches, as well as other areas of mutual interest;

3.1.2 Share experiences and exchange information about developing and implementing national clean development strategies and efforts to reduce greenhouse gas intensities;

3.1.3 Identify, assess, and address barriers to the promotion and creation of an enabling environment for development, diffusion, deployment, and transfer of existing, emerging and longer term cost-effective, cleaner, more efficient, and transformational technologies and practices in accordance with the Partners' priorities;

3.1.4 Identify and implement bilateral and multilateral cooperative activities among Partners for the development, deployment, diffusion, and transfer of existing, emerging and longer term cost- effective, cleaner, more efficient, and transformational technologies, in accordance with the Partners' priorities;

3.1.5 Facilitate collaboration among existing bilateral and multilateral initiatives and promote information-sharing on climate-related technologies of respective Partners;

3.1.6 Incorporate human and institutional capacity-building elements, as appropriate, into activities as a means to strengthen cooperative efforts;

3.1.7 Engage the private sector as an integral part of the cooperative activities of the Partnership, as well as development banks, research institutions, and other relevant governmental, intergovernmental, and non-governmental organizations, as appropriate;

3.1.8 Develop and implement work programs decided by the Partners; and

3.1.9 Assess regularly the progress of the Partnership to ensure its effectiveness.

3.2 Each Partner will undertake activities contemplated by this Charter in accordance with the laws, regulations, and policies under which it operates and applicable international instruments to which it is a party.

4 Organization

4.1 A Policy and Implementation Committee and an Administrative Support Group will be formed to facilitate implementation of the Partnership.

4.2 The Policy and Implementation Committee will govern the overall framework, policies, and procedures of the Partnership, periodically review progress of collaboration, and provide direction to the Administrative Support Group. It will be responsible for management of the implementation of the cooperative activities of the Partnership, and for engaging representatives of the private sector, as well as representatives of development banks, research institutions, and other relevant governmental, intergovernmental, and non-governmental organizations, as appropriate. It will undertake activities in the promotion and creation of enabling environments within Partners and in support of Partners' efforts to meet relevant national-level clean development objectives. The Policy and Implementation Committee may form appropriate task forces and other subgroups to assist it in its work. The Policy and Implementation Committee should meet as often as is determined necessary by its members to accomplish its work, and may focus its agenda on policy issues or technical issues, or both, as appropriate. Policy and Implementation Committee decisions are to be made by consensus of the Partners on the Committee.

4.3 The Administrative Support Group, which serves as the principal coordinator of the Partnership's communications and activities, will be responsible for: (1) organizing meetings of the Partnership; (2) arranging special activities, such as teleconferences and workshops; (3) coordinating and communicating information regarding actions of the Partnership; (4) serving as a clearinghouse of information regarding the Partnership; (5) maintaining procedures and responsibilities for key functions that are approved by the Policy and Implementation Committee; and (6) performing such other tasks as the Policy and Implementation Committee directs. The Administrative Support Group's function will be administrative in nature, and will not include matters of substance except as specifically instructed by the Policy and Implementation Committee.

4.4 The Policy and Implementation Committee comprises representatives from Partners. Each Partner included in Annex II may designate up to three representatives to meetings of the Policy and Implementation Committee.

4.5 The Policy and Implementation Committee may, at its discretion, permit other experts to attend its meetings.

4.6 The United States Government is to serve initially as the Partnership's Administrative Support Group. This arrangement will be reviewed at two year intervals and may be changed by decision of the Policy and Implementation Committee. Each Partner will designate an administrative liaison to serve as its principal point of contact for the Administrative Support Group.

4.7 The Administrative Support Group may, as required, utilize the services of personnel employed by the Partners and made available to the Administrative Support Group. Unless otherwise determined by the Partners, such personnel are to be remunerated by their respective employers and remain subject to their employers' conditions of employment.

4.8 Each Partner will individually determine the nature of its participation in Partnership activities.

5 Funding

5.1 Participation in the Partnership is on a voluntary basis. Each Partner may, at its discretion, contribute funds, personnel, and other resources to the Partnership subject to the laws, regulations, and policies of the Partner. Any costs arising from the activities contemplated in this Charter are to be borne by the Partner that incurs them, unless other arrangements are made.

6 Intellectual Property

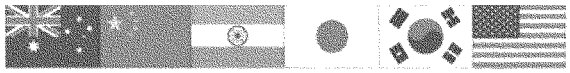
6.1 All matters related to intellectual property and the treatment thereof arising from cooperative activities of the Partnership are to be addressed on a case-by-case basis within the specific context in which they appear, bearing in mind the purposes of the Partnership.

7 Amendments

7.1 The Policy and Implementation Committee may amend this Charter and its Annex II at any time by consensus of the Partners on the Committee.

8 Term of Charter

8.1 Cooperation under this Charter will commence on 12 January 2006. Any Partner may terminate its membership upon written notice 90 days prior to the anticipated termination.



Annex I

Vision Statement of Australia, China, India, Japan, the Republic of Korea, and the United States of America for a New Asia-Pacific Partnership on Clean Development and Climate
28 July 2005

Development and poverty eradication are urgent and overriding goals internationally. The World Summit on Sustainable Development made clear the need for increased access to affordable, reliable and cleaner energy and the international community agreed in the Delhi Declaration on Climate Change and Sustainable Development on the importance of the development agenda in considering any climate change approach.

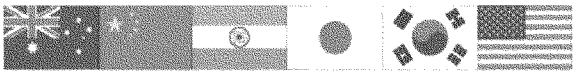
We each have different natural resource endowments, and sustainable development and energy strategies, but we are already working together and will continue to work to achieve common goals. By building on the foundation of existing bilateral and multilateral initiatives, we will enhance cooperation to meet both our increased energy needs and associated challenges, including those related to air pollution, energy security, and greenhouse gas intensities.

To this end, we will work together, in accordance with our respective national circumstances, to create a new partnership to develop, deploy and transfer cleaner, more efficient technologies and to meet national pollution reduction, energy security and climate change concerns, consistent with the principles of the U.N. Framework Convention on Climate Change (UNFCCC).

The partnership will collaborate to promote and create an enabling environment for the development, diffusion, deployment and transfer of existing and emerging cost-effective, cleaner technologies and practices, through concrete and substantial cooperation so as to achieve practical results. Areas for collaboration may include, but not be limited to: energy efficiency, clean coal, integrated gasification combined cycle, liquefied natural gas, carbon capture and storage, combined heat and power, methane capture and use, civilian nuclear power, geothermal, rural/village energy systems, advanced transportation, building and home construction and operation, bioenergy, agriculture and forestry, hydropower, wind power, solar power, and other renewables.

The partnership will also cooperate on the development, diffusion, deployment and transfer of longer-term transformational energy technologies that will promote economic growth while enabling significant reductions in greenhouse gas intensities. Areas for mid- to long-term collaboration may include, but not be limited to: hydrogen, nanotechnologies, advanced biotechnologies, next-generation nuclear fission, and fusion energy.

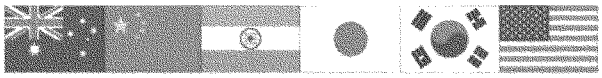
The partnership will share experiences in developing and implementing our national sustainable development and energy strategies, and explore opportunities to reduce the greenhouse gas intensities of our economies.



We will develop a non-binding compact in which the elements of this shared vision, as well as the ways and means to implement it, will be further defined. In particular, we will consider establishing a framework for the partnership, including institutional and financial arrangements and ways to include other interested and like-minded countries.

The partnership will also help the partners build human and institutional capacity to strengthen cooperative efforts, and will seek opportunities to engage the private sector. We will review the partnership on a regular basis to ensure its effectiveness.

The partnership will be consistent with and contribute to our efforts under the UNFCCC and will complement, but not replace, the Kyoto Protocol.



Annex II

Australia
China
India
Japan
Republic of Korea
United States of America

Asia-Pacific Partnership
on Clean Development and Climate
Inaugural Ministerial Meeting
Sydney, 11-12 January 2006

Work Plan

The Partnership Work Plan sets out an innovative approach of using government/industry Task Forces to develop sustainable solutions to our shared challenges through bottom-up practical action. This recognises that harnessing the power of our private sectors, our research communities and our governments is the most effective way to drive sustainable development outcomes across Partners' economies. We will bring together key experts and leaders focusing on these issues from the public, private and research sectors of our economies. We will also share experiences on related issues, for example, on workplace safety and technologies that help ensure the health and well-being of our peoples.

Our Work Plan focuses on power generation and distribution, as well as key industry sectors of our economies.

We have jointly established eight public-private sector Task Forces covering: (1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminium; (6) cement; (7) coal mining; and (8) buildings and appliances.

As a priority, each Task Force will formulate detailed action plans outlining both immediate and medium-term specific actions, including possible "flagship" projects and relevant indicators of progress. These will be submitted to the Policy and Implementation Committee for consideration as soon as practicable – if possible, by mid-2006.

In particular, we have asked the Task Forces to consider in their work the following:

- review the current status of their sector with regard to clean development and climate;
- share knowledge, experience and good practice examples of how industrial efficiency, energy efficiency and environmental outcomes can be improved, including through valuable and practical short-term actions;
- identify specific opportunities for cooperation including with relevant international financial organisations such as the Asian Development Bank and the World Bank;
- define the current state of the technology in terms of cost, performance, market share and barriers;

- identify cost and performance objectives and the actions needed to achieve these objectives; and

- identify, wherever possible, ambitious and realistic goals.

In progressing its work, each Task Force will build on the wide range of actions already in place in Partners through national programmes and other international cooperative arrangements and, where appropriate, seek to leverage existing initiatives to ensure maximum return on our resources. Projects and actions advancing technology and improving best practices in each Partner may also be linked, where useful, with others in the region, allowing us to share lessons across the Partnership.

It is anticipated that actions may include technology based research, pilot, demonstration and deployment projects, skills enhancement and exchange, commercial and information exchanges (for example industry-oriented workshops, high level policy dialogue) and measures to disseminate best practice.

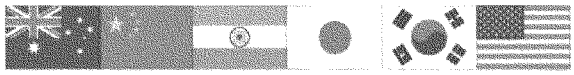
In the first stage of the Partnership we chose to focus on a number of specific areas. The Vision Statement detailed a rich array of other sectors, such as transport and agriculture, where we will explore co-operation as the Partnership develops. We envisage that future meetings will address other sectors of interest, cross-cutting matters, as well as to provide a forum for sharing experiences in developing and implementing our national sustainable development and energy strategies.

Cleaner Fossil Energy Task Force

Chair: Australia
Co-chair: China

Coal and gas are, and will remain, critical fuels for all six Partner economies. There are a range of key advanced coal and gas technologies with the potential to significantly reduce greenhouse gas emissions levels, air-borne pollutants and other environmental impacts. These are focused on a suite of technologies associated with CO2 capture and storage, as well as complementary advanced power generation systems. These include integrated gasification combined cycle (IGCC), oxy-fuel and post-combustion capture. Other technologies such as ultrasupercritical pulverised fuel, coal cleaning and treatment, poly-generation, hydrogen production, enhanced coal bed and waste coal mine methane and coal gasification and liquefaction are also important elements of a cleaner fossil energy future.

It is well understood that the costs of new technologies decline over time and a key objective for the Partnership is to accelerate the development and deployment of these technologies through collaborative research and on-going demonstration so as to reduce costs and facilitate the availability of a broad range of accessible and affordable low-emission technologies. Opportunities exist for integrating key technologies to achieve lower- or zero-emitting power production facilities.



In addition, there is a need to identify and address barriers to the delivery of liquefied natural gas, which is also needed to meet the rapidly growing need for high quality, affordable and low emission fuel in Asia-Pacific Partnership countries.

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, CO2 geosequestration 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.

Renewable Energy and Distributed Generation Task Force

Chair: Republic of Korea
Co-chair: Australia

Renewable energy technologies, such as hydro (large and mini), solar, geothermal, wind and tidal can deliver power with virtually zero emissions. Distributed generation (including landfill waste methane-based generation) also has the potential to significantly reduce emissions and promote greater cost and network efficiencies. The wide scale deployment of renewable energy and distributed generation technologies increases the diversity of energy supply, and can contribute to improving energy security and reducing fuel risks, particularly in remote and fringe-of-grid areas. These energy sources and distributed generation technologies, which are ideally suited to mid-sized and smaller scale applications can also assist in alleviating poverty by improving access to energy services, as well as increasing job opportunities and improving air quality and public health.

The emerging nature of many renewable energy technologies means that there can be market and technical impediments to their uptake, such as cost-competitiveness, awareness of technology options, intermittency and the need for electricity storage. Work is currently being undertaken by many members of the Partnership to address these barriers to increase the wide-scale uptake of renewable energy. However, advances in technology design, system planning and grid operations are demonstrating the financial viability of distributed utility applications. In addition, alternative fuels, such as biodiesel and ethanol, also can potentially offer significant environmental benefits in the future. Similarly these alternatives are also on the pathway to becoming cost-competitive and for deployment on a large-scale. The Task Force will focus on the most promising technologies and applications, particularly rural, remote and peri-urban applications, where renewable energy and distributed generation applications can be cost competitive.

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 economic development and climate goals of the Partnership.
- Promote further collaboration between Partnership members 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.

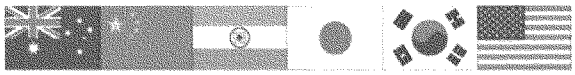
Power Generation and Transmission Task Force

Chair: United States of America
Co-chair: China

Stable and affordable supply of electricity is indispensable for our economic growth. With the advent of electricity becoming available to a large number of people in developing countries and the increasing electrification in developed countries the power generation sector is and will continue to be the largest emitter of emissions. Modelling indicates that accelerated adoption of world-best practice for thermal power generation alone would reduce global emissions by 1.5 per cent by 2010 as well as reducing air pollution. Potential areas for cooperation in the power sector would include the improvement of thermal efficiency of power plants, fuel switching and/or multi-firing, reform of electricity markets, loss reduction in transmission, and demand side management.

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, 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.

Steel Task Force

Chair: Japan
Co-chair: India

Asia-Pacific Partners account for nearly 50 per cent of the world's steel production. The Steel Task Force will facilitate the uptake of best available technology, practices and environmental management systems in Partnership countries together with increased recycling. The Task Force will assist in the provision of expert advice in relation to the opportunities to reduce greenhouse gas and other emissions levels through the introduction of existing and emerging technologies and identify any other opportunities, with an initial focus on operations in China and India. Action will focus around securing improved benchmarking and reporting, energy and material efficiencies and technology development and deployment.

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 greenhouse gas emissions from steel production.
- Increase recycling across the Partnership.

Aluminium Task Force

Chair: Australia
Co-chair: United States

Asia-Pacific Partners account for 37 per cent of the world's aluminium production. The aluminium industry is one of the fastest growing sectors, with rapid growth in developing countries.

The industry can make further improvements in environmental performance, while reducing costs, through best practice use of existing equipment (in particular perfluorocarbons (PFC) emissions management), increased uptake of best available and affordable technology (including improved instrumentation), the continued development and deployment of new technologies, and by increasing levels of recycling. Through the Partnership, countries can advance industries towards global PFC reduction objectives and address energy efficiency and other CO2 process emissions by promoting best practice performance, increasing technical support and identifying impediments to deployment of best available and affordable technology.

Objectives

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

Cement Task Force

Chair: Japan

Asia-Pacific Partners account for 61 per cent of the world's cement production. The cement Task Force would facilitate the uptake of best available technology and environmental management systems in Partnership countries. This would be through the introduction and/or replacement of old technology (primarily the wet kiln process) in favour of dry processing technologies, energy efficient technologies, process improvements, power generation from waste heat recovery and enhanced co- processing of low grade primary fuels and industry wastes. The Task Force will assist in the provision of expert advice in relation to the opportunities to reduce greenhouse gas and other emissions levels through the introduction of these existing and emerging technologies and identify other key opportunities.

Objectives

- Facilitate demonstration and deployment of energy-efficient and cleaner product formulation technologies in Partnership countries that will significantly improve the greenhouse gas 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.

Coal Mining Task Force

Chair: United States of America
Co-chair: India

Asia-Pacific Partners collectively generate approximately 65 per cent of world primary coal production. Coal is the dominant fuel source globally and among the Partners, and its use is expected to continue to grow over the coming decades. Improving the efficiency of the mining and processing of coal and improving the monitoring and control of coal mine methane gas can make a significant contribution to emissions reductions and workplace safety. The Task Force will address the reclamation and rehabilitation of mined lands, runoff, abandoned mines and best safety practice. The Coal Mining Task Force will work collaboratively with the Cleaner Fossil Energy Task Force to ensure that synergies are captured in improving coal processing and developing new coal-based generation technologies.

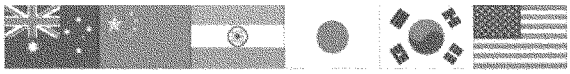
Objectives

- 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.

Buildings and Appliances Task Force

Chair: Republic of Korea
Co-chair: United States of America

Reducing our use of energy for buildings and appliances decreases the demand for primary energy and is a key means to deliver better economic performance, increase energy security and reduce greenhouse gas and air pollutant emissions. Partner countries have recognised for some time the importance of cooperating on energy efficiency for buildings and appliances, and have already taken a range of bilateral and other collaborative actions in this area. As the Partners represent a majority of the world's manufacturing capacity for a diverse range of appliances, we have the potential to drive significant regional and global improvements in energy efficiency in this sector. The Partners will demonstrate technologies, enhance and exchange skills relating to energy efficiency auditing, share experiences and policies on best practices with regard to standards and codes, as well as labelling schemes for buildings, building materials and appliances.



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.

Task Force Administration

The life of a Task Force depends on accomplishment of its objectives, which encompass both short-term and long-term actions. Partners expect to establish jointly other Task Forces in the future to explore other aspects of clean development and climate. The Task Force chairs shall be senior officials from Partnership countries and the membership of each Task Force may be drawn from the public, private and research domains so as to engage key experts.

Task Forces will report to the Policy and Implementation Committee, which will consider the action plans developed and decide which projects to formally endorse as Partnership projects. Each Partner will make its own decisions on its participation in individual projects. The Policy and Implementation Committee may approve Task Force involvement from non-Partner countries where this would enhance the effectiveness of the Task Force work.

STATEMENT OF BJORN LOMBORG, ADJUNCT PROFESSOR, COPENHAGEN CONSENSUS CENTER

Global warming has become one of the preeminent concerns of our time, and this often clouds our judgment and makes us suggest inefficient remedies. As a result, we risk losing sight of tackling the most important global issues first, as well as missing the best long-term approach to global warming.

Yes, global warming is real, and it is caused mainly by CO_2 from fossil fuels. The total cost of global warming is $5–8 trillion, which ought to make us think hard about how to address it.

However, the best climate models show that immediate action will do little good. The Kyoto Protocol will cut CO_2 emissions from industrialized countries by 30 percent below what it would have been in 2010 and by 50 percent in 2050. Yet, even if everyone (including the United States) lived up to the protocol's rules, and stuck to it throughout the century, the change would be almost immeasurable, postponing warming for just 6 years in 2100.

Likewise, economic models tell us that the cost would be substantial—at least $150 billion a year. In comparison, the United Nations estimates that half that amount could permanently solve all of the world's major problems: it could ensure clean drinking water, sanitation, basic health care, and education for every single person in the world, now.

Global warming will mainly harm developing countries, because they are more exposed and poorer and therefore more vulnerable to the effects of climate change. However, even the most pessimistic forecasts from the U.N. project that by 2100 the average person in developing countries will be richer than the average person in developed countries is now.

So early action on global warming is basically a costly way of doing very little for much richer people far into the future. We need to ask ourselves if this should, in fact, be our first priority.

Two Copenhagen Consensus priority setting roundtables, with some of the world's top economists and the top U.N. Ambassadors similarly found that Kyoto comes far down the list of global priorities (see attached priorities).

This does not mean doing nothing, but doing the clean, clever and competitive thing. Climate change should be addressed where effect is high and costs limited. Such an example is the "Asia-Pacific Partnership", which focuses on energy efficiency and diffusion of advanced technologies in electricity, transport and key industry sectors. Because it focuses on some of this century's biggest emitters, including China, India and the United States, it is forecast to reduce global carbon emissions with 11 percent in 2050—for reference, a full Kyoto would only reduce emissions by 9 percent in 2050.

In essence, the AP6 is picking up the smart, low-hanging fruits; good examples would include the many Chinese coal plants that have heat rate efficiencies around 25 percent, compared to U.S. coal plants, which have efficiencies of 33–36 percent. The United States has a lot of expertise in retrofits and improving the efficiency of coal plants in China would not only reduce fuel inputs and air pollution, but CO_2 as well.

The cost of the AP6, however, is unclear at the moment. It is seen as cheap and voluntary, but it is doubtful that entirely voluntary measures will achieve all of the AP6 potential. And certainly, in the long run, more clever measures will be needed.

For the future after 2012 we need not to propose more Kyoto-style immediate cuts, which would be prohibitively expensive, do little good, and cause many nations to abandon the entire process. We should rather be focusing on investments in making energy without CO_2 emissions viable for our descendants. This would be much cheaper and ultimately much more effective in dealing with global warming. I would suggest a treaty binding every nation to spend, say, 0.05 percent of GDP on research, development and demonstration of non-carbon-emitting energy technologies. This would, worldwide provide some $25 billion in RD&D—an almost 25-fold increase.

This approach would be five times cheaper than Kyoto and many more times cheaper than a potential Kyoto II. It would involve all nations, with richer nations naturally paying the larger share. Perhaps developing nations should being phased in or mechanisms put in place to assist them financially and technically as in the AP6. It would let each country focus on its own future vision of addressing the energy and climate change challenge, whether that means concentrating on renewables, fission, fusion, conservation, carbon storage, or searching for new and more exotic opportunities.

Such a massive global research effort would also have potentially huge innovation spin-offs. In the long run, such actions are likely to make a much greater impact

than Kyoto-style responses. Researches at Berkeley actually envision that such a level of R&D could solve global warming in the medium term.

In a world with limited resources, where we struggle to solve just some of the challenges that we face, caring more about some issues means caring less about others. We have a moral obligation to do the most good that we possibly can with what we spend, so we must focus our resources where we can accomplish the most first.

Rather than investing hundreds of billions of dollars in short-term, ineffective cuts in CO_2 emissions, we should be investing tens of billions in research, leaving our children and grandchildren with cheaper and cleaner energy options.

Bjorn Lomborg is the organizer of Copenhagen Consensus, adjunct professor at the Copenhagen Business School, and author of How to spend $50 billion to make the world a better place and The Skeptical Environmentalist.

COPENHAGEN CONSENSUS 2006

A UNITED NATIONS PERSPECTIVE

At a meeting in Washington DC on June 16th and 17th, organized by the Copenhagen Consensus Center and Georgetown University, United Nations ambassadors and other senior diplomats, including China, India and the United States, discussed priorities for international action on key challenges facing both the developing countries and the world as a whole. A good degree of consensus emerged, both on the principle of setting priorities, given competing demands on limited resources, and concerning the particular urgency of addressing certain challenges, especially in the fields of education, sanitation, malnutrition, and communicable diseases.

The countries represented were China, India, Pakistan, Tanzania, Thailand, the United States, Vietnam and Zambia. The meeting was chaired by Dr. Bjorn Lomborg of the Copenhagen Consensus Center, and co-chaired by Nobel Laureate Douglass C. North and editor Clive Crook.

The Georgetown gathering extended work first begun two years ago. At the first meeting of the Copenhagen Consensus project, in Copenhagen in 2004, a group of internationally renowned economists examined detailed submissions and presentations by expert contributors and discussants across ten challenge areas: climate change, communicable diseases, conflicts and arms proliferation, education, financial instability, governance and corruption, malnutrition and hunger, migration, sanitation and clean water, and subsidies and trade barriers. In each of these areas, specific policy opportunities were proposed and analyzed. The panel concluded by endorsing an ordered list of priorities for action, answering the hypothetical question, if the international community had an additional $50 billion to devote to new initiatives, how should that money be spent? (For further details of Copenhagen Consensus 2004, see www.copenhagenconsensus.com.)

Copenhagen Consensus 2006 followed a similar procedure, drawing on the earlier exercise. Representatives had available to them the materials from the previous meeting, and over two days heard new presentations from acknowledged economists and UN experts for each of the ten challenge areas. In each case, opportunities for action were again proposed and examined. The representatives separately ordered the multiple opportunities. Those rankings were then combined into a single ranking based on the median of the representatives' individual rankings. That group ranking is shown below:

	CHALLENGE	OPPORTUNITY
1	Communicable Diseases	Scaled-up basic health services
2	Sanitation and Water	Community-managed water supply and sanitation
3	Education	Physical expansion
4	Malnutrition and Hunger	Improving infant and child nutrition
5	Malnutrition and Hunger	Investment in technology in developing country agriculture
6	Communicable Diseases	Control of HIV/AIDS
7	Communicable Diseases	Control of malaria
8	Malnutrition and Hunger	Reducing micro nutrient deficiencies
9	Subsidies and Trade Barriers	Optimistic Doha: 50% liberalization
10	Education	Improve quality / Systemic reforms
11	Sanitation and Water	Small-scale water technology for livelihoods
12	Education	Expand demand for schooling
13	Malnutrition and Hunger	Reducing Low Birth Weight for high risk pregnancies
14	Education	Reductions in the cost of schooling to increase demand
15	Sanitation and Water	Research to increase water productivity in food production
16	Migration	Migration for development
17	Corruption	Procurement reform
18	Conflicts	Aid post-conflict to reduce the risk of repeat conflict
19	Sanitation and Water	Re-using waste water for agriculture
20	Migration	Guest worker policies
21	Sanitation and Water	Sustainable food and fish production in wetlands
22	Corruption	Grassroots monitoring and service delivery
23	Corruption	Technical assistance to develop monitoring and transparency initiatives
24	Migration	Active immigration policies
25	Subsidies and Trade Barriers	Pessimistic Doha: 25% liberalization
26	Corruption	Reduction in the state-imposed costs of business/government relations
27	Climate Change	The Kyoto Protocol
28	Conflicts	Aid as conflict prevention
29	Corruption	Reform of revenue collection
30	Financial Instability	International solution to the currency-mismatch problem
31	Conflicts	Transparency in natural resource rents as conflict prevention
32	Conflicts	Military spending post-conflict to reduce the risk of repeat conflict
33	Financial Instability	Re-regulate domestic financial markets
34	Conflicts	Shortening conflicts: Natural resource tracking
35	Financial Instability	Reimpose capital controls
36	Financial Instability	Adopt a common currency
37	Subsidies and Trade Barriers	Full reform: 100% liberalization
38	Climate Change	Optimal carbon tax
39	Climate Change	Value-at-risk carbon tax
40	Climate Change	A carbon tax starting at $2 and ending at $20

The representatives agreed to a large extent that high priority should be given to initiatives on communicable diseases, sanitation and water, education, and malnutrition. In some cases, there was greater disagreement over the choice of particular opportunities within a given

challenge area. In education, for instance, some representatives attached the highest priority to physical expansion of education infrastructure; others attached higher priority to systemic reform of education delivery. In communicable diseases, some representatives ranked scaled-up basic health services as the best opportunity; others ranked specific initiatives as HIV/AIDS or malaria prevention as a better opportunity. In the area of trade, the highest rank was given to an optimistic outcome of the Doha round.

In the lower reaches of the joint ordering, a more marked degree of agreement was apparent. Initiatives in the challenge areas of financial instability, conflict prevention and climate change were placed toward the bottom of the list by almost all of the representatives.

All the representatives declared that they had found the exercise useful.

Further meetings of the Copenhagen Consensus project are planned.

Website: www.copenhagenconsensus.com.

Contact: Project Manager, Mr. Tommy Petersen at tp.ccc@cbs.dk or +45 3815 2252.

Washington D.C. June 20, 2006

Copenhagen Consensus: The Results

The goal of the Copenhagen Consensus project was to set priorities among a series of proposals for confronting ten great global challenges. These challenges, selected from a wider set of issues identified by the United Nations, are: civil conflicts; climate change; communicable diseases; education; financial stability; governance; hunger and malnutrition; migration; trade reform; and water and sanitation.

A panel of economic experts, comprising eight of the world's most distinguished economists, was invited to consider these issues. The members were Jagdish Bhagwati of Columbia University, Robert Fogel of the University of Chicago (Nobel laureate), Bruno Frey of the University of Zurich, Justin Yifu Lin of Peking University, Douglass North of Washington University in St Louis (Nobel laureate), Thomas Schelling of the University of Maryland, Vernon Smith of George Mason University (Nobel laureate), and Nancy Stokey of the University of Chicago.

The panel was asked to address the ten challenge areas and to answer the question, "What would be the best ways of advancing global welfare, and particularly the welfare of developing countries, supposing that an additional $50 billion of resources were at governments' disposal?" Ten challenge papers, commissioned from acknowledged authorities in each area of policy, set out more than 30 proposals for the panel's consideration. During this week's conference the panel examined these proposals in detail. Each paper was discussed at length with its principal author and with two other specialists who had been commissioned to write critical appraisals, and then the experts met in private session. The panel then ranked the proposals, in descending order of desirability, as follows:

Project rating		Challenge	Opportunity
Very Good	1	Diseases	Control of HIV/AIDS
	2	Malnutrition	Providing micro nutrients
	3	Subsidies and Trade	Trade liberalisation
	4	Diseases	Control of malaria
Good	5	Malnutrition	Development of new agricultural technologies
	6	Sanitation & Water	Small-scale water technology for livelihoods
	7	Sanitation & Water	Community-managed water supply and sanitation
	8	Sanitation & Water	Research on water productivity in food production
	9	Government	Lowering the cost of starting a new business
Fair	10	Migration	Lowering barriers to migration for skilled workers
	11	Malnutrition	Improving infant and child nutrition
	12	Malnutrition	Reducing the prevalence of low birth weight
	13	Diseases	Scaled-up basic health services
Bad	14	Migration	Guest worker programmes for the unskilled
	15	Climate	Optimal carbon tax
	16	Climate	The Kyoto Protocol
	17	Climate	Value-at-risk carbon tax

Note to table: Some of the proposals were not ranked (see text below)

In ordering the proposals, the panel was guided predominantly by consideration of economic costs and benefits. The panel acknowledged the difficulties that cost-benefit analysis must overcome, both in principle and as a practical matter, but agreed that the cost-benefit approach was an indispensable organising method. In setting priorities, the panel took account of the strengths and weaknesses of the specific cost-benefit appraisals under review, and gave weight both to the institutional

preconditions for success and to the demands of ethical or humanitarian urgency. As a general matter, the panel noted that higher standards of governance and improvements in the institutions required to support development in the world's poor countries are of paramount importance.

Some of the proposals (for instance, the lowering of barriers to trade or migration) face political resistance. Overcoming such resistance can be regarded as a "cost" of implementation. The panel took the view that such political costs should be excluded from their calculations: they concerned themselves only with those economic costs of delivery, including the costs of specific supporting institutional reforms, that would be faced once the political decision to proceed had been taken.

For some of the proposals, the panel found that information was too sparse to allow a judgement to be made. These proposals, some of which may prove after further study to be valuable, were therefore excluded from the ranking.

Each expert assigned his or her own ranking to the proposals. The individual rankings, together with commentaries prepared by each expert, will be published in due course. (The challenge papers and other material have already been placed in the public domain.) The panel's ranking was calculated by taking the median of individual rankings. The panel jointly endorses the median ordering shown above as representing their agreed view.

The panel assigned the highest priority to new measures to prevent the spread of **HIV/AIDS**. Spending assigned to this purpose would yield extraordinarily high benefits, averting nearly 30m new infections by 2010. Costs are substantial, estimated at $27 billion. Even so, these costs are small in relation to what stands to be gained. Moreover, the scale and urgency of the problem—especially in Africa, where AIDS threatens the collapse of entire societies—are extreme.

Policies to attack **hunger and malnutrition** followed close behind. Reducing the prevalence of iron-deficiency anaemia by means of food supplements, in particular, has an exceptionally high ratio of benefits to costs; of the three proposals considered under this heading, this was ranked highest at $12 billion. The expert panel ranked a second proposal, to increase spending on research into new agricultural technologies appropriate for poor countries, at number five. Further proposals, for additonal spending on infant and child nutrition, and on reducing the prevalence of low birth-weight, were ranked eleventh and twelfth, respectively.

The panel considered three main proposals for global **trade reform**: first, multilateral and unilateral reduction of tariffs and non-tariff barriers, together with the elimination of agricultural subsidies; second, extension of regional trade agreements; third, adoption of the "Everything But Arms (EBA)" proposal for non-reciprocal lowering of rich-country tariffs on exports from the least developed countries. In the case of trade reform, lives are not directly and immediately at risk. However, the first proposal—free trade—was agreed to yield exceptionally large benefits, in relation to comparatively modest adjustment costs, both for the world as a whole and for the developing countries. Accordingly it was ranked third. (Some members of the panel argued that since this proposal need not involve any budgetary outlays, it should be acted upon in any case, regardless of the resources available for additional budget outlays.) The proposal to extend regional FTAs was not ranked, for lack of information on particular agreements. The proposal for non-reciprocal lowering of barriers to exports of the least developed countries was also not ranked, with some members of the panel noting that this proposal would harm many poor countries not

participating in the arrangements, while encouraging those that did participate to invest in activities that are not internationally competitive.

New measures for the control and treatment of **malaria** were jointly ranked fourth. At $13 billion in costs, the ratio of benefits to costs was somewhat lower than for the proposals on HIV/AIDS and hunger and malnutrition, but still extremely high by the ordinary standards of project appraisal. This is especially so for the provision of chemically-treated bednets. Again, the scale and urgency of the problem are very great.

The panel agreed with the challenge paper on **water and sanitation** that lack of safe and affordable access to these services is a great burden for more than a billion of the world's poorest people. Almost half of the people living in developing countries suffer at any given time from one or more water-borne diseases. Three proposals, including small-scale water technology for livelihoods, were regarded as likely to be highly cost-effective, and were placed sixth, seventh and eighth in the panel's ranking.

The experts considered five proposals for improving **governance** in developing countries. While agreeing, as already noted, that better governance is very often a precondition for progress of any kind, the panel thought it inappropriate to include four of these proposals in their ranking. This is because these reforms involve costs of implementation that will differ greatly according to each country's particular institutional circumstances. The experts felt they had too little specific information to make a judgement about what those costs might be. The panel did however express its support for the proposal to reduce the state-imposed costs of starting a new business, on the grounds that this policy would be not only enormously beneficial but also relatively straightforward to introduce. This proposal was placed ninth in the ranking.

Policies to liberalise international **migration** were regarded as a desirable way to promote global welfare and to provide economic opportunities to people in developing countries. A lowering of barriers to the migration of skilled workers was recommended, and ranked tenth. Guest-worker programmes, of the sort common in Europe, were not recommended, owing to their tendency to discourage the assimilation of migrants.

The panel looked at three proposals, including the Kyoto Protocol, for dealing with **climate change** by reducing emissions of carbon. The expert panel regarded all three proposals as having costs that were likely to exceed the benefits. The panel recognised that global warming must be addressed, but agreed that approaches based on too abrupt a shift toward lower emissions of carbon are needlessly expensive. The experts expressed an interest in an alternative, proposed in one of the opponent papers, that envisaged a carbon tax much lower in the first years of implementation than the figures called for in the challenge paper, rising gradually in later years. Such a proposal however was not examined in detail in the presentations put to the panel, and so was not ranked. The panel urged increased funding for research into more affordable carbon-abatement technologies.

The panel considered proposals to improve the provision of **education** in developing countries. It agreed that in countries where spending on education is at present very low the *potential* exists for large benefits in return for modestly increased spending. However, the institutional preconditions for success are demanding and vary from case to case. Experience suggests that it is easy to waste large sums on education initiatives. Given this variety of circumstances and constraints, the panel chose not to

rank any proposals in this area. However, the experts did endorse the view that externally supervised examinations improve accountability of schools and should be promoted. They also expressed an interest in schemes to reduce, in a targeted way, the fees charged in many developing countries for public education, and to pay grants to families which send their children to school. More research on experience with such schemes is needed.

In considering a series of proposals for reducing the incidence of **civil wars**, the panel unanimously agreed with the challenge paper's assessment that the human and economic costs of such conflicts are enormous—even larger, in fact, than is generally assumed. Measures to reduce the number, duration or severity of civil wars would stand very high in the ordering, if they could be expected with any confidence to succeed. Members of the panel were unpersuaded that the proposals put before them met that test. The panel noted the strong *prima facie* case for additional financial support for regional peacekeeping forces in post-conflict countries which meet certain criteria, but felt that the information before them was insufficient for them to assign a ranking. The experts also noted the evidence that growth in incomes reduces the long-term incidence of civil war; to the extent that their highest-ranked proposals raise incomes, they will have the additional benefit of reducing the incidence of conflict.

Four proposals before the panel addressed the issue of international **financial stability**. The panel, noting the complexities and uncertainties in this area, chose not to come to a view about which, if any, of these proposals to recommend. They were therefore not ranked.

The Effect of Kyoto

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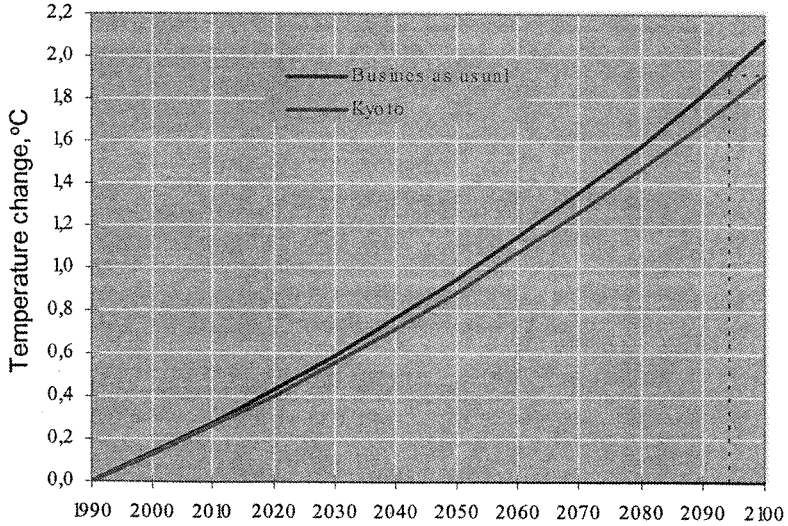
- Postpone Warming for 6 years in 2100



Source: Wigley 1998

The Cost of Kyoto

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- $150 billion/year
- For $75 billion/year we can solve all major basic problems
  - Clean drinking water
  - Sanitation
  - Basic healthcare
  - Education

Priorities from Copenhagen Consensus

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Very good investments	1	Prevent HIV/AIDS
	2	Prevent micronutrient malnutrition
	3	Ensure free trade
	4	Prevent malaria
	...	
Bad investments	...	
	16	Kyoto Protocol

My Proposal

COPENHAGEN CONSENSUS CENTER

- 0.05% of GDP on RD&D of non-carbon-emitting energy technologies
  - One-fifth of Kyoto cost
  - Global $25 billion, 25-fold increase
  - renewables, fission, fusion, conservation, carbon storage
  - huge innovation spin-offs
  - Can solve global warming (550ppm)

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 United States 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 stated last year:

> 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 buildup of carbon dioxide that has already occurred: stronger hurricanes, melting ice caps, killer heat-waves, and severe droughts. NASA reported last week that the Arctic ice cap is melting at an unprecedented rate. 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 concentrations of CO_2 and other global warming gases are kept from exceeding 450 ppm CO_2-equivalent 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 an ambitious but achievable annual rate of emission reductions—

[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-change-final.pdf* (emphasis added).

one that gradually ramps up to about 3.2 percent reduction per year. (See Figure 1.)

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 between two- and three-fold, to 8.2 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.

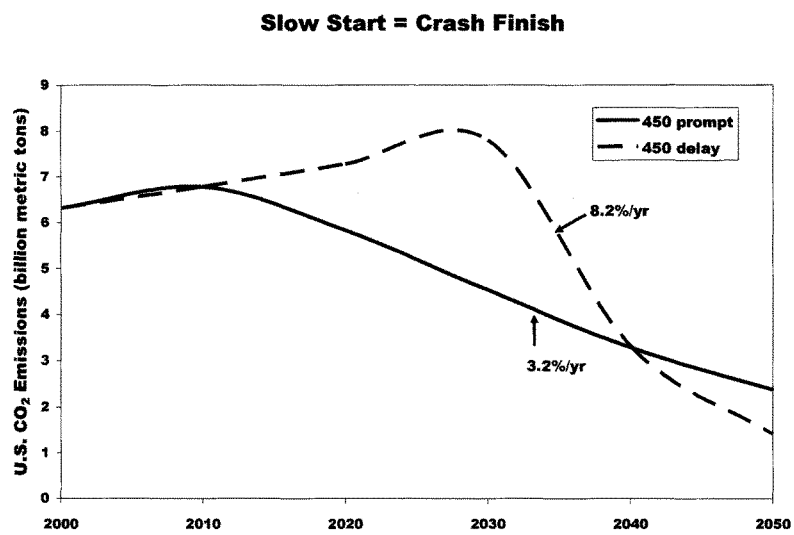


Figure 1. Prompt start and delay pathways consistent with stabilizing heat-trapping gases at 450 ppm CO_2-equivalent. Global emissions 2000-2100 are 1760 Gt CO_2 from Meinshausen's S450Ce scenario.[2] The U.S. share of global emissions is assumed to decline from 25% to 5% linearly between 2000 and 2100. This results in an emissions budget for the U.S. of 308 Gt CO_2 in the 21st Century. In the prompt start case emissions decline by 1.5%/yr from 2010 to 2020, 2.5%/yr from 2020 to 2030 and 3.2%/yr thereafter. The delay case assumes that emissions grow by 0.7%/yr from 2010 to 2030, a reduction of 0.5%/yr compared to the Energy Information Administration forecast;[3] they must decline by 8.2%/yr thereafter to limit cumulative 21st Century emissions to 308 Gt CO_2.

[2] Simple Model for Climate Policy assessment (SiMCaP), available at: http://www.simcap.org/

[3] Reference case from U.S. Department of Energy, Annual Energy Outlook 2006 with Projections to 2030, Report # DOE/EIA-0383(2006)

Here's a commonsense illustration of what this means. Imagine driving a car at 50 miles per hour, and you see a stop light ahead of you at a busy intersection. If you apply the brakes early, you can easily stop your car at the light with a gentle deceleration.

The longer you wait to start braking, the harder the deceleration. There's some room for choice. Within some limits, you can brake late and still stop in time. But the higher your speed, the earlier you must start braking. If you wait too long, you'll find yourself in the middle of the intersection with your forehead through the windshield.

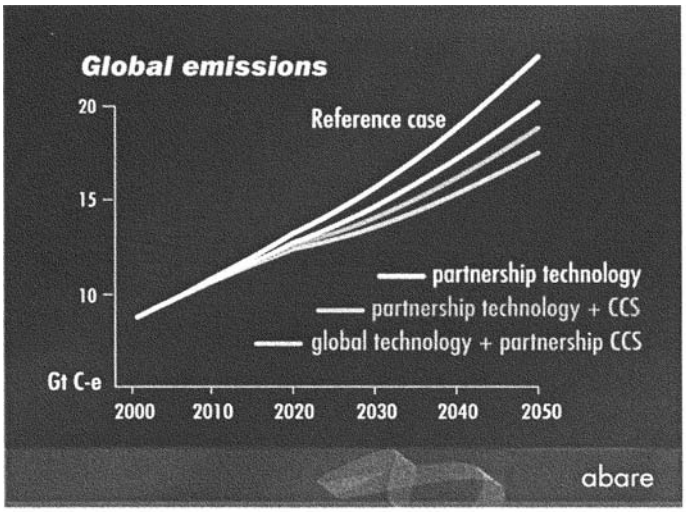
The captain of the Titanic learned a similar lesson. If he had started turning just a couple of minutes earlier, he would have missed the iceberg. But traveling at full speed, by the time he saw the iceberg, it was too late to miss it. He lost his ship. Will we repeat the same mistake?

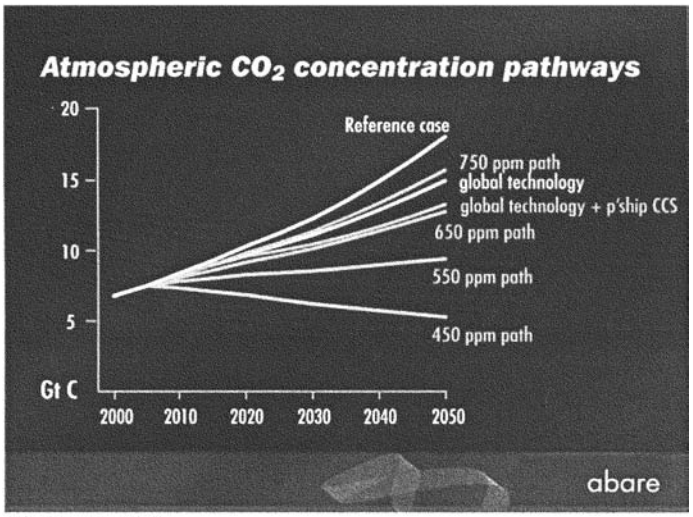
Advocates of the Asia Pacific Partnership's voluntary approach argue that it is still cheaper to delay mandatory emission cuts because (somehow) we will develop breakthrough technologies in the interim and these will enable faster reductions later at lower cost. But this argument is implausible for two reasons. First, as already demonstrated, delaying the start of reductions dramatically increases the rate at which emissions must be lowered later. Reducing emissions by more than 8 percent per year would require deploying advanced low-emission technologies at least several times faster than conventional technologies have been deployed over recent decades. Second, delay means that a whole new generation of capital investment will be made in billions of dollars of high-emitting capital stock—conventional powerplants, vehicles, etc., that will be built or bought during the next 10–20 years in the absence of meaningful near-term limits. Under the delay scenario, our children and grandchildren would then have to bear the costs of prematurely retiring an even bigger capital stock than exists today. Even taking discounting into account, it is virtually impossible that delaying emission reductions is cheaper than starting them now.

Limited as it is to voluntary measures, the Asia Pacific Partnership has no hope of preventing the "crash finish" scenario. Indeed, the Asia Pacific Partnership approach will only guarantee that we reach extremely dangerous CO_2 concentrations. This is demonstrated by an analysis done for the Australian government (an APP partner) by the Australian Bureau of Agricultural and Resource Economics (ABARE).[4]

The ABARE analysis assumed that the Asia Pacific Partnership meets its stated goal that all new powerplants built after 2015 in the United States, Australia, and Japan, and after 2020 in China, India, and South Korea are equipped with carbon capture and storage (CCS) technology and deposit their CO_2 emissions underground. ABARE further assumed that this technology gradually diffuses around the world. The analysis also included modest improvements in efficiency and some other zero-emission generation (renewables and nuclear). No limits are placed, however, on existing powerplant emissions, or on other sectors. With these assumptions, ABARE finds that even if the Partnership's goals are met, CO_2 emissions and concentrations keep rising above 650 ppm—well over a doubling of pre-industrial levels. See Figures 2 and 3. This would lock in devastating climate impacts.

[4] Technological Development and Economic Growth, ABARE research report 06.1 (January 2006).





Figures 2 and 3

VOLUNTARY MEASURES AREN'T WORKING AT HOME EITHER

The Asia Pacific Partnership is only the latest manifestation of the president's "voluntary" policy. That approach, however, is not working at home either. 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 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 1990's. (See Figure 4.)

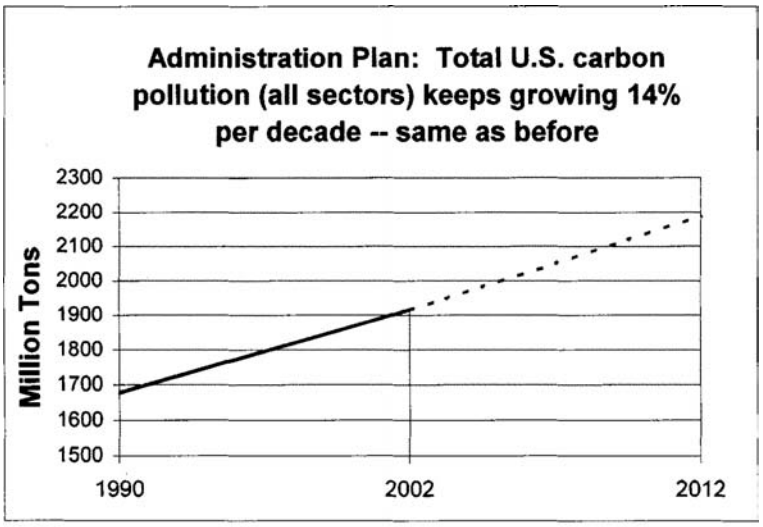


Figure 4

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 powerplant emissions in the northeast and in California. California and 10 other states have adopted limits on global warming emissions from motor vehicles. Last month, California—the 12th largest emitter in the world—enacted the most far-reaching state plan to reduce the state's global warming pollution to 1990 levels by 2020. The state's new law enjoys wide support from businesses and other constituencies, going well beyond the usual environmental suspects: PG&E; Silicon Valley Leadership Group; Bay Area Council; Sacramento Municipal Utility District; Waste Management; Calpine; California Ski Industry Association; the cities of Los Angeles, San Francisco, Oakland, and Sacramento; the American Academy of Pediatrics; the California Nurses Association; CDF Firefighters; and Republicans for Environmental Protection.

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. More than 200 cities have announced plans to reduce their global warming pollution.

The constituency for real action is broadening and 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.

In April, 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 powerplants 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 obvious benefits 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 macro economic 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.[5]

• 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 20 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.[6]

• 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.[7]

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 "G–8 plus 5"—

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

[6] 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

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

the major industrial nations plus China, India, Mexico, Brazil, and South Africa. A consensus on a new market-based agreement among under 20 countries—including Europe, the United States, 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 United States 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 voluntary rules.

The results of the Asia Pacific Partnership process so far are truly meager. Limited by the U.S. "voluntary only" approach, the meetings thus far have been nothing more than a gabfest about process and studies. The participants released a grab bag of announcements about sharing technology experiences and agreeing to meet again. The United States put a measly $50 million on the table—not even enough to build one clean electricity plant.

China, India, and the United States are planning to build hundreds of new powerplants 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 Asia Pacific Partnership 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 last April to the Energy Committee, without mandatory limits on emissions, there is no market.

Without mandatory limits, the Asia Pacific Partnership 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.

The climate of poverty:

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Introduction

If 2005 was the year of Make Poverty History, then 2006 is turning into the year of Climate Change. Scarcely a week goes by without a new set of statistics being released or leaked, showing the accelerating process of global warming – and prompting ever more dire predictions about the future of the planet.

It may seem, then, that the news agenda has moved on – away from issues of aid, debt and trade, and how they affect the world's poorest people. Christian Aid, however, believes that poverty and climate change are inextricably linked.

As this report graphically illustrates, it is the poor of the world who are already suffering disproportionately from the effects of global warming. The report also definitively shows that poor people in the world's most vulnerable communities will bear the brunt of the forecast 'future shock'.

The potential ravages of climate change are so severe that they could nullify efforts to secure meaningful and sustainable development in poor countries. At worst, they could send the real progress that has already been achieved spinning into reverse. No other single issue presents such a clear and present danger to the future welfare of the world's poor.

Climate change, then, is a pressing poverty issue.

The facts in this report are harsh. The well-founded fears of what, on present trends, lies in store for the poor people of the world are even starker. But Christian Aid is also here to offer a message of hope – there are things that can be done. It doesn't have to be all doom and gloom if urgent action is taken by those with the power to deliver a radical change of direction.

One particularly stark figure in the report emphasises this need for urgency. Our research, based on current scientific predictions, has revealed that 185 million people in sub-Saharan Africa alone could die of disease directly attributable to climate change by the end of the century.

That is three times the population of the UK condemned to die because of the spread and increasing intensity of disease, caused by rising temperatures over which they have little or no control. And that is only the start. What is true for people in sub-Saharan Africa in terms of disease is true for poor people across the developing world.

Elsewhere, an even greater threat will come from floods and ever more frequent natural disasters. Tens of millions of people are likely to be made homeless and left without the means of growing food or making a living to support their families.

Everywhere, the twin threats of drought and famine – caused by increasingly unpredictable rain patterns in tropical areas – are expected to bring even more misery. The unfolding disaster in east Africa, where 11 million people have been put at risk of hunger by years of unprecedented drought, is a foretaste of what is to come.

And where resources are scarce, particularly water, there are the seeds of continuing or accelerating conflict between increasingly desperate populations.

Pestilence, floods, famine and war. An apocalyptic collection, indeed.

Christian Aid is turning its development and campaigning energies towards these issues because action is needed urgently. From this point on, the effects of climate change on the world's poorest people will become a major focus of our work. We are also adding our voice to those demanding that governments across the globe take immediate steps to cut back on life-destroying carbon emissions.

We believe that, as a development agency, we bring a new perspective to the debate, viewing as we do environmental issues through the prism of poverty. The stark fact is that climate change has already begun to impact detrimentally on poor people.

According to the UK government's Department for International Development, some 94 per cent of disasters and 97 per cent of natural-disaster-related deaths occur in developing countries. Scientific opinion is moving inexorably towards acknowledging that the increasing incidence and severity of 'extreme weather events' that provoke many disasters is connected to climate change.

The European Commission has also concluded that climate change is no longer just an environmental issue. 'It is also clearly a development problem since its adverse effects will disproportionately affect poorer countries.'

In June 2005, in the run up to the G8 meeting at Gleneagles, the academies of science of the world's 11 richest countries (the G8 countries plus India, China and Brazil) made a joint statement calling for urgent action to combat climate change. Never before have the academies issued such a statement.

If climate change remains unchecked, it is difficult to see how the UN's millennium development goals, which aim to halve world poverty by 2015, can be met. Again, real progress towards these goals could go into reverse in the longer term unless something is done to arrest the rate of environmental degradation.

In this sense, the environment is too important to be left to the environmentalists.

Politicians are now grasping the climate change argument and in the UK are vying to appear greener than one another. The Conservatives have made their 'Quality of life challenge', which includes a review of their policies on climate change and carbon emissions. Labour has Gordon Brown, the Chancellor of the Exchequer, proposing a new World Bank fund of US$20 billion to help poorer countries pay for 'clean' technologies as they develop.

The World Bank has picked up the idea of a fund and recently published proposals for a 'clean energy investment framework', detailing how the US$20 billion would be raised, allocated and spent.[1]

Mr Brown has also established a Treasury commission, under the leadership of former World Bank chief economist Sir Nicholas Stern, to consider the economic implications of climate change. Its report is due out later this year.

The Irish government has proposed the Irish Aid Environmental Policy for Sustainable Development, with an accompanying three-year action plan.

While these initiatives are laudable, as with all statesmen's grand statements, they will need to be closely monitored to make sure that they are delivered. Most importantly, they need to target the world's poorest people.

The other main message of this report is that there are concrete actions that can be taken to help people work their way out of poverty without risking further climate change and its associated threats. Christian Aid is offering a model for a different kind of development – one not fuelled by an ever-increasing use of carbon-based energy, such as oil or coal.

It shows how renewable energy could provide radical improvements to the lives of some of the world's poorest and most marginalised people – tangible benefits delivered on a timescale of months not decades.

Light for schools or small businesses, which can only currently operate during daylight hours, creating new opportunities – especially for women. Power for water pumps, doing away with the arduous daily slog to the nearest well. Energy for refrigeration units, meaning vital vaccines and other drugs can be kept safely.

These show how communities and countries can aspire to a better future, without repeating the destructive mistakes of the rich, industrialised world. There are real alternatives.

The report also engages in some genuine 'blue sky' thinking to illustrate how renewable energy could even make sub-Saharan Africa a net exporter of clean, sustainable power in the future. This could alleviate many of its economic problems, while providing a solution to the rich world's apparently insatiable desire for dirty power.

Much of our analysis concentrates on sub-Saharan Africa – which has the highest concentration of the world's poorest people. It is also the one place on earth where development is actually going backwards; economically, people are worse off here than they were a decade ago. In health terms, they are more frequently ill and die younger.

So, the first of our case studies is **Kenya**, where we examine how climate change is fuelling violence in drought-hit areas. Pastoralists in the north of the country have started killing each other over the right to water their cattle at a diminishing number of watering holes. Experts predict that the situation can only deteriorate as climate change bites deeper.

We also look at **Bangladesh**, where virtually the entire population is precariously perched just above sea level. Predicted rises in this level would leave millions displaced and dispossessed. There is, quite literally, nowhere for them to go. Already, families are having to move every couple of years, as increased melt water from the Himalayan glaciers sweeps their land and fragile livelihoods away. Without concerted efforts to alleviate these effects, say experts there, we can forget about making poverty history – climate change is set to make it permanent.

As ever, Christian Aid is speaking out on behalf of those who have most to lose from a continuation of climate chaos – poor people. Rich countries must take responsibility for having largely created this problem – and cut CO_2 emissions radically. Leaders must have the political courage to set clear targets to reduce their national emissions, and then have the ingenuity and vision to find the ways and means to hit those targets.

We are calling on Britain and Ireland to lead the way by setting an annual, constantly contracting 'carbon budget', which plots a course, year on year, towards a two-thirds reduction in emissions on 1990 levels, by 2050.

This does not mean that governments of developing countries can turn a blind eye to climate change. Those that have enjoyed economic growth, such as India, China and Brazil, should agree to reduce emissions and set targets for doing so – ideally as part of the deal that must be struck to succeed the Kyoto protocol.

We also believe that a ninth millennium development goal – calling on governments to reduce emissions as a critical contribution to the fight against poverty – should be added to the existing eight.

Christian Aid, for its part, will set its own targets to reduce emissions. As an agency that seeks to serve poor people, we must not contribute to their suffering. We will encourage our supporters to do the same.

The reality, though, is that climate change is already taking place and will inevitably continue. Poor people will take the brunt, so we are calling on rich countries to help them adapt as the seas rise, the deserts expand, and floods and hurricanes become more frequent and intense. Specific aid packages should compensate poor countries for their losses, as well as helping them plot a clean route to development.

These payments must not be taken from existing aid budgets, but instead represent additional aid in recognition of the historical and ongoing responsibility rich nations bear for the impact of their actions on the developing world.

It is time that we truly shared the welfare of the planet, for the good of us all.

The five warmest years on record:
1/ 2005 2/ 1998 3/ 2002 4/ 2003 5/ 2004 [1]

[illegible] 2006

Climate change – destroying development

A chain of young men draw water for their cattle deep from one of the few permanent boreholes in the Daaba region of drought-stricken Isiolo district, Kenya.

To understand how the climate affects poor people, it is first important to understand how it is changing – and why. A decade ago, the subject was fraught with uncertainty, but today the science of climate change has solidified into a real consensus on what is altering the atmosphere and who is to blame.

The Intergovernmental Panel on Climate Change (IPCC), established by the United Nations Environmental Programme (UNEP) and the World Meteorological Office (WMO) in 1988, has become the 'gold standard' of the scientific community. It sifts through all the available evidence to see what is genuinely known about the topic across the world as well as assessing climate predictions. In 2001 it famously presented its Third Assessment Report (TAR) which concluded that there was overwhelming evidence to assert that human activities were causing the earth to warm.

During the 20th century the world's average surface temperatures increased by approximately 0.6°C – two-thirds of that rise has taken place since 1975. Looking ahead, the IPCC forecasted that mean surface temperatures would increase by between 1.5°C and 6°C by 2100, with sea levels set to rise by between 15 and 95 centimetres (6 to 37 inches) by the end of the century.

Since its publication, a considerable number of further scientific studies have backed up the IPCC report's basic assertion that the world is getting damagingly warmer. The BBC recently reported senior sources from within the IPCC as saying that scientists were forecasting a doubling of greenhouse-gas concentrations in the atmosphere by 2100 that would cause a temperature rise of 2-4.5°C, or maybe more.[2]

One of the IPCC report's authors told Christian Aid, on the condition that he remain anonymous, that one of the most disturbing aspects of the current data was how fast temperatures were rising. 'What is significant is that what we have measured in actual temperature rises is on the upper end of the scale of predictions prior to 2001. This means we were underestimating the rapidity with which the earth was warming,' he said.[3]

The 2001 report's pivotal assertion was that mankind was to blame for this warming effect. It ascribed the huge leap in the energy-trapping gases in the earth's atmosphere, which amplify the otherwise natural greenhouse effect, to human activities.

The phrase 'greenhouse gases' mainly refers to carbon dioxide (CO_2), which is produced by the burning of fossil fuels, such as oil, coal and gas. Other gases, such as methane and nitrous oxide, also play an important part in locking warmth into the earth's atmosphere. The IPCC's 2001 report found that since the mid-18th century, the amount of CO_2 in the atmosphere had increased by some 31 per cent, from about 280 parts per million to approximately 367 parts per million.

The UK's chief scientific advisor, Professor Sir David King, recently said that a level of 550 parts per million is the absolute maximum that the earth can 'afford' to maintain and that we were currently heading towards much higher levels that were 'more like 900 to 1,200 parts per million'.

In 2004, the International Energy Agency (IEA) predicted that CO_2 emissions would increase by another 63 per cent by the year 2030.[4] The IEA said this would ensure that the earth warmed up by between a further 0.5°C and 2°C by 2050 – an increase that would certainly have devastating implications for poor countries.

In summary, the evidence shows that the earth is heating up and that mankind is largely responsible for the gases that cause the warming. What has not yet been proven is the effect that this warming has on local weather systems. Up until now this relationship has been inferred rather than proven despite the fairly common-sense connection.

This is about to change. The IPCC will present its Fourth Assessment Report in 2007, when it is expected to make explicit the fact that global warming is directly responsible for the changing climate.

It is hard to overstate the importance of this conclusion for poor people. For the first time, scientists will lay out in hard technical terms what ordinary people around the world have sensed for some time: namely that 'something is going on' with their local climate.

This chapter will outline just how these changes have already devastated the lives of poor people all over the world, whether through disasters, disease, drought, famine or flood. It also gathers together existing evidence and new research to predict how these apocalyptic forces will intensify over the coming decades if nothing is done to arrest the headlong carbon charge. The news is universally grim.

'Africa, of course, is also seen by experts as particularly vulnerable to climate change. The size of its land mass means that in the middle of the continent, overall rises in temperature will be up to double the global rise, with increased risk of extreme droughts, floods and outbreaks of disease.'[5]

Tony Blair, January 2005

Climate, poverty and disasters

Tracking climate change is not a straightforward matter of measuring how hot the planet is becoming. This is exemplified by sub-Saharan Africa where the scientific consensus is that the climate will become increasingly variable. The dry areas in both the north and south will get drier while the wet tropics will get even wetter. At the same time, sea levels are predicted to rise and affect large swathes of Africa's coastline, while the frequency and intensity of severe weather events is likely to increase.

How will this affect poor countries and their people? The answer is both directly, through extreme weather events such as floods and storms, and indirectly, because of long-term weather changes that cause famine and droughts. 'Climatic extremes such as drought and flooding take a direct toll on lives, health, livelihoods, assets and infrastructure,' says the International Research Institute for Climate Prediction (IRI) at Columbia University, New York.[6]

Climate experts often stress that there is no way, given the huge number of meteorological factors involved, that global warming can be proven to have caused any one extreme weather event. There has been some debate, for instance, over whether the conditions leading up to Hurricane Katrina, which hit New Orleans in 2005, were caused by global warming or were part of a natural pattern. There is, however, growing agreement that climate change may account for the strength of a hurricane.

US scientists conclude that 'there is no way to prove that Katrina either was or was not affected by global warming. For a single event, regardless of how extreme, such attribution is fundamentally impossible...' But they also state that 'the available scientific evidence indicates that it is likely that global warming will make – and possibly already is making – those hurricanes that form more destructive than they otherwise would have been.'[7]

Overall, what these trends do show is that extreme weather

Haiti

Climate change is making storms in the Caribbean more intense. And when bad weather strikes, it hits poor people hardest.

Haiti is not only the poorest country in the western hemisphere, it comes below many African countries on the human development index. While conflict-ridden Sudan is rated 142 out of 177, Haiti is 153rd. The Dominican Republic is at 95 on the same league table even though it shares the same land mass as Haiti, occupying the eastern half of Hispaniola.

This extreme poverty makes the Haitian population more vulnerable to the effects of climate change. Hurricanes and tropical storms are common throughout the Caribbean, but in Haiti their toll is often much more severe.

When tropical storm Jeanne hit Haiti in September 2004, nearly 3,000 people lost their lives, even though the winds weren't even fierce enough to be deemed hurricane force.[10] The same storm hit Jamaica, but caused very few casualties.

When rains come in this part of the world, they come hard and fast. The town of Fonds Verettes has been washed away three times in ten years. People continue to rebuild in the riverbed because they have nowhere else to go.

Elamene Valcin tends a small plot on the steep slopes of a hillside overlooking a dry riverbed in the Terre Froide region of south-eastern Haiti.

Before the floods, the Valcin family had a horse to transport their potatoes, corn, beans and poultry to market. But when the storm came, the horse was killed. Now Elamene is forced to sell most of her produce in front of her house for less money, and she has lost the income she used to make from renting her horse.

Her case exemplifies one aspect of the vicious circle that bedevils the Haitian economy and degrades the country's environment. When livestock and crops are lost, one of the few reliable sources of income left in Haiti is cutting down trees, manufacturing charcoal and selling it. Like most of their neighbours, Elamene and her family are forced to chop trees between harvests.

This has accelerated a process of deforestation that has being going on in Haiti since colonial times. The situation is so extreme that only two per cent of the country's entire forest cover is left.

The cycle of poverty-related environmental degradation is very difficult to break. The Haitian economy is already heavily dependent on charcoal as a source of energy, and as the poor get poorer, there is little chance of investing in alternatives. Nearly all industrial production, from bakeries to distilleries, relies on wood-based products for fuel. Altering that dependence would require significant assistance to help households and factories use alternative energy sources.

With the landscape deprived of trees and their roots, the recurring hurricanes wash away the country's rich topsoil into the rivers and oceans – making farming even more difficult. It also makes the terrain more dangerous. The lack of trees and topsoil mean the hillsides

events have been increasing in both number and ferocity over recent years. The Red Cross's World Disasters Report is the most authoritative source on the issue and it states with clear confidence that weather-related disasters have soared over the past 40 years.

The number of reported natural disasters has almost trebled from 1,110 during the 1970s, to 2,935 between 1993 and 2002.[8] During the same period, the numbers of people affected by storms and floods rocketed from 740 million people to 2.5 billion. Similarly, the cost of the damage increased five-fold to US$655 billion.

These statistics also show that the numbers of people who were killed by natural disasters fell during this period from 1.96 million during the 1970s to 531,000 between 1993 and 2002. But the figures do not include 2004 and 2005 when hundreds of thousands of people died during the Asian tsunami and several severe floods. The Red Cross also notes that the fall may have been largely the result of better disaster preparedness.

It is clearly not the case that *all* extreme weather events have been caused by global warming, but it is reasonable to assume that a significant proportion of the increase has been connected to it. Again, the world's leading climate scientists are expected to make this link explicit in the forthcoming IPCC report.

The true message is that poor people are the ones who suffer most when extreme weather strikes. They may not have access to formal information networks that could alert them that a storm is coming; they tend to live on land that is more susceptible to storms or flooding because they cannot afford to live anywhere else; and they often depend on the land for their livelihoods, land vulnerable to severe weather.

As the Red Cross puts it: 'This growing vulnerability is intimately tied to development patterns: environmentally unsound practices, global environmental changes, population growth, urbanisation, social injustice, poverty and short-term economic vision are producing vulnerable societies.'[9]

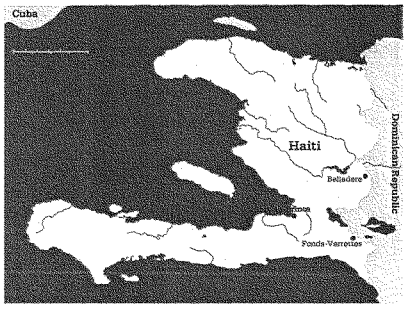
can easily become deadly mudslides.

Not only does poverty greatly magnify the effects of hurricanes, but there is growing conviction that the frequency and severity of storms hitting the region is increasing as a result of climate change.

'It is clear that hurricanes have been hitting the island more often and with much more force over the past decade,' says Moïse Jean Paul, the coordinator of the Haitian environment ministry's climate-change programme.

Another significant problem is the country's changing rainfall patterns. In Terre Froide, the barren, dusty landscape has seen hardly any rain in several months. The topography looks more like sub-Saharan Africa than the western Caribbean. But at other times, the same landscape sees people's homes being washed away by floods.

In some areas of the country, annual rain levels have risen and in others they have fallen. In a place where 70 per cent of the population depends directly or indirectly on agriculture, such precipitation changes can be devastating.[11] Irrigation systems are almost non-existent, so nearly all agriculture is rain fed. Farmers are at the mercy of the elements. If they plant a little too early or too late, they can lose their whole crop.



'Climate change can affect human health directly (eg impacts of thermal stress, death/injury in floods and storms) and indirectly through changes in the ranges of disease vectors (eg mosquitoes), water borne pathogens, water quality, air quality, and food availability and quality.'[12]

IPCC Third Assessment Report, 2001

Disease

When the great heatwave of the summer of 2003 struck Paris, it left 12,000 people dead. Throughout the rest of Europe a further 27,000 died. These were not the young and strong that perished, but the elderly and weak.

It is a deadly axiom that it is poor people in the poorer countries of the world who will suffer and die most from the diseases that the changing climate will leave trailing in its wake. A 2003 World Health Organisation (WHO) report estimated that the annual death toll from such diseases was already 150,000.

Christian Aid estimates that by the end of this century, climate-change-associated diseases on their own will have killed around 182 million people in sub-Saharan Africa.

It is not just extremes of heat that can kill. According to the WHO's report, climate change was responsible for 2.4 per cent of all cases of global diarrhoea and two per cent of world wide malarial cases.[13]

Jeffrey Sachs of the Earth Institute at Columbia University in New York, says that up to 3 million people die of malaria each year.[14] Some 90 per cent of these deaths – 2.7 million a year – are in Africa, most of them young children under five.[15]

Malaria has a close relationship with the temperature. If cooler regions become warmer, the malarial mosquito will be able to survive and spread. Scientists now predict that wetter, warmer weather will take the disease into new regions making it more lethal than ever. Already there are signs that the disease has extended into previously cool highland areas of Tanzania and Rwanda. And increased rainfall in the tropical zones of Africa, as predicted by the IPCC, will encourage an increase in the numbers of malaria-carrying mosquitoes there.

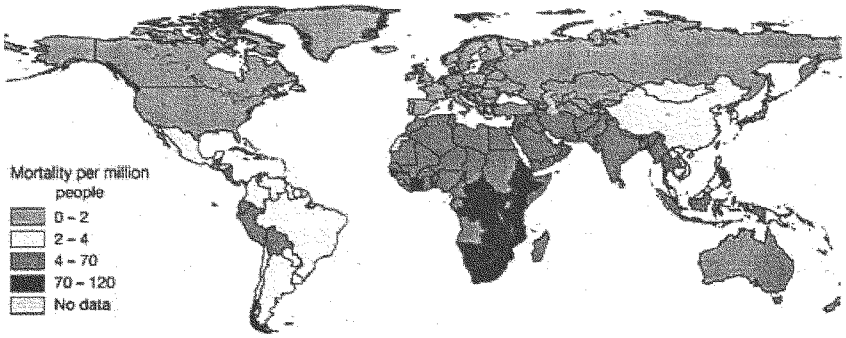
Dengue fever, which is also carried by mosquitoes, is climate sensitive too. Increased rainfall in hot areas encourages the female to breed simply by creating more warm pools of water in far more places. Meanwhile, hot, fetid conditions encourage the spread of cholera, which is also associated with the poor sanitary conditions that typically follow floods.

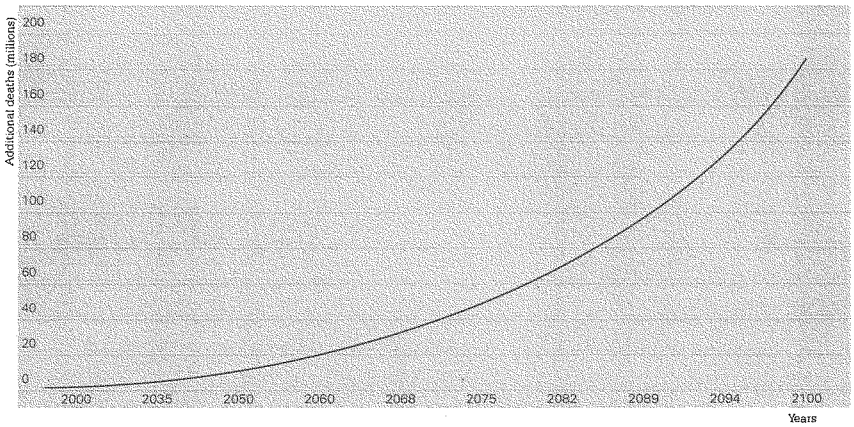
Rift Valley fever and the parasitic disease visceral leishmaniasis are associated with increased rainfall. Leishmaniasis, referred to historically as the 'Aleppo boil', is a deadly parasitic disease caused by the bite of the female sand fly. It is estimated to infect half a million poor people a year.[16]

Diarrhoea can vary with seasons – in the tropics peak diarrhoea rates are associated with the rainy season. Other diseases of the gut, such as infection, giardia and typhoid, follow suit so it is likely that the warmer and wetter conditions predicted for tropical regions will make them more prevalent – which, yet again, will primarily affect poor people.

Meningitis, on the other hand, thrives in hot dusty regions, typified by the Sahel – that area of Africa immediately south of the Sahara desert. Meningitis is also likely to increase in the more arid conditions that climate change is predicted to bring there.

Below: Estimated deaths due to climate change in 2000, based on comparison with 1961-1991 climates
Source: World Health Organisation data quoted in Patz *et al* 2005[17]





Above: Predicted extra deaths from disease attributable to climate change in sub-Saharan Africa (based on IPCC worst-case scenario of a 6°C temperature rise by the end of the century)

The strong association between climate change and disease was outlined in a seminal paper in the magazine *Nature* in November 2005. American academic Professor Jonathan Patz and others showed how climate-change-associated diseases particularly hit poor people, with sub-Saharan Africa being the worst affected.

Looking at 47 out of the 53 African countries, Patz managed to isolate the figure of an extra 176 people in every million of the population who had died of disease associated with climate change. Christian Aid has taken this work further to project how many sub-Saharan Africans might die from climate-change-associated diseases by the end of the century (see table above).

If we use a 'middle' UN projection for population rise in sub-Saharan Africa and plot it against the IPCC's worst-case scenario of the earth's temperature rising by 6°C by the end of the century, we arrive at a horrifying total of more than 182 million deaths from climate-change-associated diseases in sub-Saharan Africa by the year 2100. While these figures are a projection and so cannot be absolutely precise, they do point to the vast scale of the problem.

But this disturbing glimpse into the lives of poor people in a climate-changed future is by no means complete. Droughts, famines, floods, a rise in the sea level and scarcity-induced conflict are other, equally tangible, ways that climate change will kill.

Droughts and food

Water is vital in the truest sense of the word. With none to drink we die of thirst. With none to water our crops, we starve. With too much of it, in the form of floods, we drown.

In rich countries water is taken for granted. Save for the odd hosepipe ban, it is always on tap for domestic, industrial and agricultural use. But in the developing world, where most people depend on agriculture to earn a living or just stay alive, it is a scarce and precious resource.

In Africa, 70 per cent of the working population rely on agriculture to make a living, and it contributes 40 per cent of the continent's collective GDP.[18] Some estimates suggest climate change will reduce Africa's crop yields by ten per cent and in some regions by even more: maize production is forecast to fall by 33 per cent in Tanzania; and millet by between 20 and 76 per cent and sorghum by between 13 and 82 per cent in Sudan.[19]

The IPCC's 2001 report concluded that temperatures in Africa had risen by 0.6° C during the last century. The effects of this are two-fold: in some wet, tropical regions rainfall is increasing, while in already arid areas there is even less rain.

This type of climate change has meant that it is the water supply that is affected first. And as agriculture is dependent on rainfall, this change in weather patterns puts huge numbers of predominately poor people's livelihoods at risk.

A lack of rain brings drought and that means that people who cannot afford to move or buy water start to die. The drought that gripped the Horn of Africa in 2005 and 2006 bears this out. Nobody knows the full extent of a tragedy that is still unfolding, but the UN estimates that 11 million lives are at risk.

The long-term picture is no less bleak. There is still some disagreement over whether the Horn will get more or less rain as a result of future warming. But recent IPCC research suggests that even if there is slightly more precipitation in the Sahel, as some predict, this will do little to ameliorate the region's increased aridity. This is because the rise in temperatures there will mean that the extra heat of the day will evaporate what little additional rainfall there is, before it has the chance to do any good.

Serigne Kandji, a tropical-ecology scientist at the World Agroforestry Centre in Nairobi, Kenya, suggests that the major concern in the Sahel is the possible increase in the frequency and intensity of droughts. This would make it extremely difficult for Sahelian countries to achieve their millennium development goals, the targets set by the UN to halve poverty by 2015.

Furthermore, as Kandji says: 'If action to tackle this is not taken immediately, food deficits will become more pronounced, aggravating an already worrying food and nutritional situation. Indeed, climate change is likely to become the greatest obstacle to achieving food security [and] poverty reduction.'[20]

Last year Wulf Killman, chairman of the UN Food and Agriculture Organisation's (FAO) Climate Change Group, warned world leaders meeting at Gleneagles for the G8 summit that the droughts that had devastated Central America and parts of Asia and Africa would not only continue but get worse – and Africa would bear the brunt. 'Africa is our greatest worry... we would expect areas which are already prone to drought to become drier with climate change,' he said.[21]

The FAO identified the Horn, Zimbabwe, Malawi and Zambia as those parts of Africa most at risk of drought and its concomitant – famine. In Malawi, for example, after the 'hidden' famines of 2003, which killed untold thousands of poor people living in remote rural areas, it was estimated that one person in three needed assistance because of lack of rain.

As populations have increased, people have been pushed out onto less productive areas of land which are even more susceptible to drought. Jennifer Olson, regional coordinator for land use at the International Livestock Research Institute in Kenya, says these small-scale, subsistence farmers are often the most vulnerable to the weather hazards associated with climate change.

'Rainfall is the biggest variable for crop and animal production here,' she says. 'Everything goes up and down depending on how the rainy seasons are going, so climate change is going to have a huge impact with the expansion of people cropping into more marginal areas. These tend to be the people on the edge of doing well anyway because there's not enough rainfall for them to be productive.'[22]

Droughts and famines tend to happen quickly and the consequences for people and economies are dramatic. But even gradual climate change can have a direct and damaging effect on economies, and particularly food-related industries.

The UK government's Department for International Development (DFID), identifies one example of this 'slow-burn' effect: 'Gradual changes may also be a concern: studies show that an increase in temperature by an average of 2°C would drastically reduce the area suitable for growing Robusta coffee in Uganda, where it is a major export crop, limiting it to the highlands only.'[23]

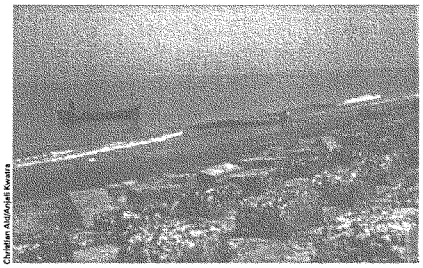
The EU is seriously concerned that climate change will cause a more widespread and permanent shift in food production along these lines. It identifies food-deficient small African countries as particularly vulnerable, adding that '... where fish constitute a significant source of protein for the poor, declining and shift of resources (of fish stocks) due to additional climate change stress may impact on their food security.'[24]

Impact on fish stocks has already been seen in the great African lakes that have provided east Africans with food for thousands of years. These are already feeling the strain because of unsustainable practices, such as introducing foreign species like Nile perch. Now, local people talk of a huge fall in the number of fish in the Rift Valley lake system. And in 2003, *Nature* reported that Lake Tanganyika (which borders Tanzania, the Democratic Republic of Congo, Zambia and Burundi) had seen fish stocks decline by 30 per cent over the past 80 years.[25]

Climate change reduces crop yields, forcing people to look for alternative sources of food, and putting even more pressure on fish stocks. Conversely, when people who rely on fish find stocks diminishing, they will turn to farming in marginal areas, with all the problems that entails.

'When the apocalyptic horsemen of famine and pestilence appear, war can't be far behind.'[26]

Scott Fields, environmentalist, 2005



Christian Aid/Arijit Kundu

The government tries to protect the shore from erosion by building embankments along the beach in Kutubdia, an island off the southern coast of Bangladesh that has shrunk by almost half in the past 50 years due to coastal erosion

Ice, floods and sea rises

Paradoxically, too much water is as much a consequence of global warming as its opposite, drought.

In Africa, major glaciers and ice caps on Mount Kenya, Ruwenzori and Kilimanjaro are melting fast (Kilimanjaro has lost some 82 per cent of its mass since 1912). But this tends to contribute more to drought than flood as it depletes natural reservoirs. Warmer temperatures are making more water than usual cascade down from the Himalayas. These increased water flows are posing real dangers to the millions of poor people who inhabit the fertile but flood-prone riverbanks of Bangladesh (see the case study on page 32).[27]

A fifth of the country endures some kind of flooding every year. But it is clear that flood damage has become more extreme in the past 20 years. In 1988, and again ten years later, two-thirds of Bangladesh was covered in water. During the floods of 2004, 80 per cent of crops were damaged or destroyed and more than 30 million people left homeless.

Bangladesh also faces acute danger from another effect of climate change – rising sea levels. Most of the country lies less than ten metres above sea level and around 17 million people live on land less than a metre higher than the sea. It is not surprising, therefore, that climate experts see Bangladesh, one of the most densely populated countries in the world, as among the most vulnerable to even small changes in sea levels.

The top end of the IPCC's sea-level forecasts – rises of between 15 and 95 centimetres – would leave a fifth of the country permanently under water and force some 35 million people to abandon their homes and seek shelter inland. While there are no predictions about how many would die as a result, this scenario is a grim one.

There is no doubt that rising sea levels will be one of the costliest effects of climate change, both in terms of lives and economic damage. Aside from Bangladesh, several other low-lying nations are also predicted to suffer badly. According to an IPCC assessment in 1998, a one-metre rise would displace 10 million people in Vietnam, 8-10 million in Egypt and several hundred thousand on islands in the Indian and Pacific oceans.

A recently leaked DFID paper on the implications of climate change for the developing world also paints a bleak picture for Africa if sea levels rise. A quarter of all Africans live within 100km of the continent's coast, and the DFID paper reports that the number of people at risk from coastal flooding is set to rise from 1 million in 1990 to 70 million in 2080.[28]

In Tanzania, for example, the IPCC suggests that a 50-centimetre rise in sea levels (which is in the middle of its forecasts) would flood more than 2,000 square kilometres and cost around US$51 million.[29]

Flash floods kill tens of thousands of poor people every year. Sustained periods of unseasonably heavy rain can also have a damaging impact on agriculture, causing the loss of topsoil and serious nutrient leaching.

The widespread floods that ravaged Mozambique in 2000 and 2001, killing hundreds, provide a telling example of what such a disaster can do to a country where infrastructure is poor and the people poorer. Heavy rains in January 2000 were followed by tropical cyclone Connie, which dumped record amounts of rain on the capital Maputo and the nation's southern watersheds. A few weeks later another cyclone dropped more rain across the region, submerging an area nearly the size of Belgium and the Netherlands combined.[30]

A third of the country's crops were ruined, roads and railway lines were destroyed, entire villages disappeared, and hundreds of thousands of people were made homeless. According to the International Federation of Red Cross and Red Crescent Societies, 350,000 lost their jobs, which undermined the livelihoods of 1.5 million people.

Conflict

Climate change fuels conflict. If temperatures are increasing in areas that are already hot, it will have a direct effect on the scarce resources required to sustain life: water, food, crops and livestock. When it becomes warm enough, wells will dry, livestock will die, crops will wither and there will not be enough food.

'Let those who emit no carbon, cast the first refugee out.'[31]

Simon Slater and Matthew Turner

In east Africa, a combination of drought and famine brought on by increasingly varied – and generally warmer – temperatures has led to flare-ups among nomadic pastoralists.

Pastoralists have a history of disputes with each other. One of the prime causes of these conflicts, alongside increased weaponry and traditional economic disputes, is the drying out of wells, making livestock routes unsustainable. Nomads wander further afield with their animals and inevitably intrude into other areas, perhaps with settled populations. The ensuing competition for resources frequently ignites into fighting (see the case study on Kenya on page 28). For example, in certain areas of Uganda more prone to the vicissitudes of the climate, conflict between tribes and cattle rustlers has increased.[32]

Often conflict, drought and famine interact with each other in a terrible, destructive cycle. Sometimes it is difficult to discern which is the trigger, but it is never hard to tell who suffers most.

During the Sudanese drought of 1997, some 100,000 poor people died.[33] It is clear that conflict exacerbated the drought and famine because it interrupted lines of supply and hindered emergency provision.

Siri Eriksen of Oslo University, is a former senior research fellow at the Center for International Climate and Environmental Research. She says: 'Although many conflicts are politically instigated and driven by underlying political inequities in resource access rather than climate change as such, increasing drought stress can exacerbate conflict and violence.'[34]

Refugees

The number of refugees created by climate change could be set to dwarf the numbers caused by conflict or political and economic necessity.

When land becomes uninhabitable because of drought, flood or sea-level rise, people will naturally seek to move to a safer location. This in itself can cause conflict, and if some of the predictions about climate change and the associated weather extremes do come about, the numbers forced to move will be massive.

The Red Cross has already identified that 25 million refugees (58 per cent of the global total)[35] owe their displacement to climate change and some believe that figure is about to get much higher.

The IPCC has estimated that by 2050, a combination of rising sea levels, erosion and agricultural damage due to climate change could make 150 million people environmental refugees.

Clearly, a movement of people on this scale will be unprecedented and will cause major social and economic upheaval and conflict. The impact on the countries to which these refugees flee is likely to be severe, creating huge new swathes of poverty.

Spiral of despair

Poverty and climate change go hand in hand. A review of floods, disease, drought and conflict shows that climate change affects poor people more than any anyone else – and exacerbates their poverty.

Many of the burdens that poor people in Africa have to endure have always been around. Disease, for example, is not new to the continent. But climate change not only increases the incidence of disease per se but also makes the impact of that disease profoundly worse.

Dealing with HIV, for example, will be made far harder. If there is a famine caused by unusual warming, or a drought, or a spread of another disease, the effect on HIV treatment could be devastating.

As DFID puts it: 'The poor have mechanisms to cope with climate variability but many of these will be overwhelmed by the extent of changes or by other pressures on their livelihoods... Pastoralists in Kenya were unable to draw on traditional migration strategies during the 2000 drought because land had been sold off to meet income needs and more affluent farmers had erected barriers across grazing lands.'[36]

So, climate change both poses its own dangers as well as insinuating itself around existing problems and amplifying them. That is what makes it such an enemy of the struggle against poverty.

Empowering the poor

Photo: Pablo Bartholomew | Getty Images

If it is poor countries and poor people who are in gravest danger from the fall out of climate change, what can be done?

The same scientists who are arriving at consensus on the damage greenhouse gases cause are also in agreement that the first major step towards tacking the problem is to cut down on these emissions.

This obvious step is clearly one that Christian Aid would endorse. Unless we dramatically reduce the emissions that are damaging the atmosphere and changing the climate, we are probably doomed as a species; poor people first and then the rest.

A crucial point to bear in mind, however, is that poor people are not significant users of fossil fuel. Africa's total emissions of CO_2 are about nine times higher than in 1950. But in 2002 they had only reached 235 million metric tonnes is significantly less than the output from many individual developed countries.[1]

Even this tells a slightly skewed story, as the handful of more developed countries within Africa account for most of its carbon dioxide emissions. South Africa accounts for 40 per cent of the total and Algeria, Egypt, Libya, Morocco and Nigeria a further 44 per cent. At the same time, no less than 28 African countries produce so little CO_2 that they register only 0.1 metric tonnes per person per year[2] compared, for example, to one American who emits 24 tonnes a year.[3]

What these figures point to is a vast discrepancy between rich and poor. The richer and more developed the country, the larger the damaging fog of greenhouse gas that surrounds it; the poorer the country, the fewer emissions. Industrialised nations account for some 80 per cent of all the carbon dioxide in our atmosphere.

It is for this reason that the Kyoto protocol has provided a 'sliding scale' of cuts to emissions, with most of the richer

India and China

Rapid economic growth in India and China has dramatically inflated demand for energy – and, since the vast majority of the power generated in each country is from coal, oil and gas, carbon emissions have followed suit.

China's GDP doubled from a little more than US$500 billion in 1995 to around US$1.1 trillion in 2005, and is expected to double again in the next ten years. While the country's consumption of energy per dollar of GDP has fallen, indicating increased efficiency, the doubling of its GDP has seen carbon emissions rise from around 800 million metric tonnes in 1995 to more than 1.2 billion metric tonnes in 2005. Against the projected further doubling of GDP by 2015 is a predicted 50 per cent rise in emissions.[5]

China is now the world's second-largest consumer of energy and, concomitantly, the second-highest emitter of greenhouse gases, behind the US.[6] Nevertheless, because of its large population (1.3 billion in 2003), its annual per capita emissions of 2.7 metric tonnes' are still well below the global average, and just one-ninth that of the US. China, on the other hand, has a lot of growing still to do – 150 million of its people are still poor.[8]

India's GDP has also doubled, from more than US$320 billion in 1994 to almost US$690 billion in 2004.[9] Similarly, its carbon emissions have increased from 190 million metric tonnes in 1994 to 251 million metric tonnes in 2001.[10] It too has per-capita carbon emissions below the international average, at 1.2 metric tonnes a year.[11] And India also has huge scope for growth – 28.6 per cent of its population, some 300 million people, live below the poverty line.

Neither India nor China are Kyoto protocol 'annex 1' countries, which means they are not obliged to make cuts in greenhouse-gas emissions. In each case, their per-capita annual emissions are still low, but clearly if every person in India or China were to pollute to the same extent as a US or even European citizen, any chance of taming climate change would be lost.

Current patterns of energy consumption give little cause for hope. Both countries are heavily dependent on fossil fuels. China, according to popular climate change folklore, is building coal-fired power-stations at a rate of one per week.

There are, however, some positive signs. In the past two decades, by employing measures to increase energy efficiency, China has reduced its expected energy use by a carbon equivalent of 250 million tonnes.[12] Beijing has recently begun to deploy 'energy police' in an attempt to cut excessive lighting and heating in commercial premises.[13] The Chinese government has passed laws allowing energy from renewable sources to be sold into the grid at a higher tariff and encouraging property developers to build more energy-efficient housing and offices. It has also famously introduced a tax on disposable items, such as wooden chopsticks.

China will soon be home to the world's largest 'ecocity'. Dongtan, situated on a coastal plain close to Shanghai, will house 50,000 people by 2010 and half a million by 2050. Its buildings will be energy efficient and designed to have

The richer and more developed the country, the larger the damaging fog of greenhouse gas that surrounds it.

countries committed to greater reductions than the poorer ones. The spectacular exceptions to this are the US and Australia who have refused to ratify Kyoto, despite the fact that the US is biggest CO_2 emitter in the world and Australia is the second largest in per capita terms.

Christian Aid fully supports this principle of the 'polluter pays', because if climate change is the threat we believe it to be, the best way rich countries can help poor ones is to cut back strenuously on pumping greenhouse gases into the atmosphere we all share.

'What is required is a social mobilisation that insists on cuts in greenhouse gas emissions by industrialised countries in the order of 60-80% (relative to 1990 levels) by the middle of this century – far beyond the targets of the Kyoto protocol,' says Global Health Watch.[4]

Governments urgently need to play a role and take climate change far more seriously than they have done so far. The UK government, for example, admitted in April 2006 that it is actually falling *behind* its stated target of a 20 per cent cut in the UK's emissions by 2012.

Energising development

If rich countries should be obliged to make substantial cuts in their emissions, what about poorer countries? How can they climb out of poverty without using the very same fossil fuels that we know to be so destructive to the climate and to their own long-term development?

In the short term, the use of fossil fuels, in the absence of immediate alternatives, is essential for developing countries. It is because they currently produce so little CO_2, compared to industrialised nations, that they should not, for the time being, be asked to make any cuts in their emissions.

a low environmental impact. All its transport and residential and commercial properties will be powered by wind, sunlight, or other renewable energy sources.[14]

More modest schemes are also in evidence in India. On the island of Sagar in the Ganges delta, for instance, the West Bengal Renewable Energy Development Agency has built a network of solar power plants connected to a localised grid system that provides energy to communities between 6pm and midnight. Bringing power to the predominantly poor communities on Sagar has revolutionised life there, enabling small businesses to operate in the evenings and adults to study – boosting literacy rates.[15]

But these are rays of hope in an otherwise gloomy picture. Despite the high levels of economic growth in India and China, they are still home to almost half of the world's poor people. As the New Economics Foundation recently revealed, for every US$100 increase in GDP, only US$0.60 goes to poor people, making growth a hugely inefficient means of tackling poverty.[16]

Furthermore, when it is powered by coal, oil and gas – which seems inevitable given that both countries are suffering a power deficit – growth also leads to increased carbon emissions. Both countries are likely to experience climatic changes. Projections for India show increased rainfall of between 10 and 30 per cent in the centre of the country and a rise in average peak temperatures of 3-4°C by the end of the century. Among other things, these factors will increase the number of months malaria can be transmitted by mosquitoes, especially in the north of the country.[17]

Once again, it is poor rural communities – still sizeable in both countries – that will be at the sharp end. Unchecked increases in emissions are not in their interests. And, as is the case for the rural poor in Africa, large-scale power generation – including India's much-heralded, US-endorsed nuclear programme – may not be the answer to their energy needs. It is likely to be hugely costly and will rely on a grid system to reach remote communities.

As the example of Sagar illustrates, poor communities without power can be transformed with modest and, most critically, renewable sources of energy. This is a win-win scenario. It means communities are able to leap forward because they have power, but do not shoot themselves in the foot because that power causes further emissions that ultimately undermine their development through climate change.

The situation in India and China further underlines the importance of leadership in rich, industrialised countries that are still big emitters and bear the historical responsibility for the unsustainable level of greenhouse gases in the atmosphere. There is a clear role for the UK, Europe and individual states within the US – in lieu of the US government signing up to Kyoto – to lead by example and illustrate willingness to cut emissions and invest in renewable energy so that China, India and other larger developing countries have the confidence to do the same.

'Americans have been on a two-decade oil pig-out, gorging like oversized vacationers at a Vegas buffet.'[18]

Fortune magazine, 2004

That said, developing countries must now begin a fundamental switch away from fossil fuels to renewable energies like solar, wind, geothermal, biomass and hydropower, for these three powerful reasons:

- **Economic.** It already clear that fossil fuels, particularly oil, will become increasingly expensive for developing countries.
- **Environmental.** If poor countries do follow the fossil-fuel development models of richer countries in the North or the new developing nations like China and India, it would, in all likelihood, result in an enormous increase in global warming. If emissions from poor countries simply replaced those from rich ones, the damage to developing nations would merely continue.
- **Pro-poor.** On a more optimistic note, renewable energy could not only fuel cleaner growth in poorer countries but also present some startling and positive opportunities for a different kind of development. The potential to use renewables to enhance the lives of nearly a third of the world's population who currently live without electricity – or 'off-grid' – is immense and at the heart of Christian Aid's pro-poor analysis of how to respond to the challenge of climate change.

Economic cost

Oil is still the world's major source of energy and carbon emissions, providing 40 per cent of the planet's power. The two other big hydrocarbon fuels – and therefore CO_2 emitters – are gas and coal, which provide a further 23 per cent each.

It's not just Americans in gas-guzzling Humvees who are to blame. Europe, Australia, China and India have all seen oil consumption increase in the past decade so that globally around 84 billion barrels of the black stuff is now pumped out of the ground every day.[19] In 2004, demand increased by 2.6 million barrels a day.[20]

A report by the Exxon-Mobil Corporation projected that the world will need 40 per cent more energy in 2020 than it does today. It also predicted that consumption levels would reach the equivalent of 300 million barrels a day, with most of the new demand coming from increased energy use in poor countries.[21]

But oil is a finite substance and one day will run out. As it becomes scarcer, it will also become harder to extract, as it will be deeper underground or in fields that are more difficult to get at. So even before the last drop of oil is squeezed out of the earth it will become prohibitively expensive.

The point at which there is less oil in the ground than has already been extracted is known as the 'Hubbert Peak', in honour of the American geologist who correctly predicted the peak supply of US oilfields.

After it has reached the Hubbert Peak, oil becomes more expensive. Today there is fierce debate between scientists about when we'll reach this global peak. Some say we have already passed it while others predict it won't come for another 20 years or so.

Most, however, believe that this peak is imminent. Within most of our lifetimes, then, oil will probably become significantly more expensive as demand increases for a diminishing supply.

Some argue that prices might level out for a period as technology becomes more efficient at extracting the deposits. But there will inevitably come a moment when even the most efficient technology will not be able to hold back the price of a dwindling oil pool.

In December 2005, analysts at investment bank Goldman Sachs predicted that high oil prices had entered a 'super spike' phase that could last for four more years, in contrast with other predictions that said that crude oil prices had reached their peak earlier in 2005. The analysts said oil demand remained resilient while supply was lacklustre, prompting them to keep their average US crude price forecast for the whole of 2006 at US$68 a barrel – a massive leap from an average of US$24.9 per barrel just four years ago. They also predicted that oil prices could soon see 1970s-style price surges to as high as US$105 a barrel.[22]

The world's volatile political situation has also helped to raise oil prices. Some of the major oil-producing regions are the most vulnerable to the kind of pressure that halts oil production and sends prices soaring.

This year, for example, geopolitical reasons have helped increase the oil price to more than US$60 per barrel and in April 2006 crude oil prices reached an all-time high of US$72 a barrel. The prospect of conflict between the West and Iran over its nuclear ambitions and local unrest in Nigeria, which reduced its oil-producing capacity, sent a cold shiver through the market. The situation in Iraq is still highly unstable and Saudi oil installations have been attacked.

Add to this Hurricane Katrina, which temporarily halted oil production in the Gulf of Mexico, and even the oil-loving US President George W Bush was forced to admit at the beginning of 2006 that his country had to be weaned off its addiction to oil.

If, as is likely, oil prices increase even further, the effect on developing countries can be expected to be severe. To measure the likely impact, we have calculated how much rising oil prices could cost sub-Saharan Africa as it looks to fund its development.

If the region continues using oil as its primary energy

source, it will need substantial amounts to power its growth. Christian Aid has postulated two scenarios using the New Economics Foundation's figures, shown in the table below.

Assuming that the cost of oil rises moderately until 2015, sub-Saharan Africa will end up spending US$45.9 billion per year on oil – 5.8 per cent of its GDP.

The second is the more realistic 'high' oil-price scenario. This would see sub-Saharan Africa spending US$83.6 billion on oil, representing 10.6 per cent of its total GDP in 2015 (compared with 3.3 per cent in 2004). This means that rising oil price rises between 2004 and 2015 would force sub-Saharan Africa to spend an extra US$57.4 billion on buying oil.

Either scenario involves billions of dollars going to oil companies instead of being spent on things that really matter to poor people. Indeed, if the high oil-price scenario becomes a reality, the US$57.4 billion extra sub-Saharan Africa will have to pour into oil companies' coffers could instead vaccinate the world's children (US$450 million);[23] send them to primary school (US$5.6 billion);[24] provide antiretroviral therapy and HIV education to everyone who needs it in low- and middle-income countries (US$15 billion);[25] buy an insecticide-treated mosquito net (costing US$3) for everyone in the world (US$18 billion) and still leave more than US$18 billion to spare.

Without this money to spend on these poverty-related areas, the chances of reaching the millennium development goals (MDGs) by 2015 grow ever more unrealistic.

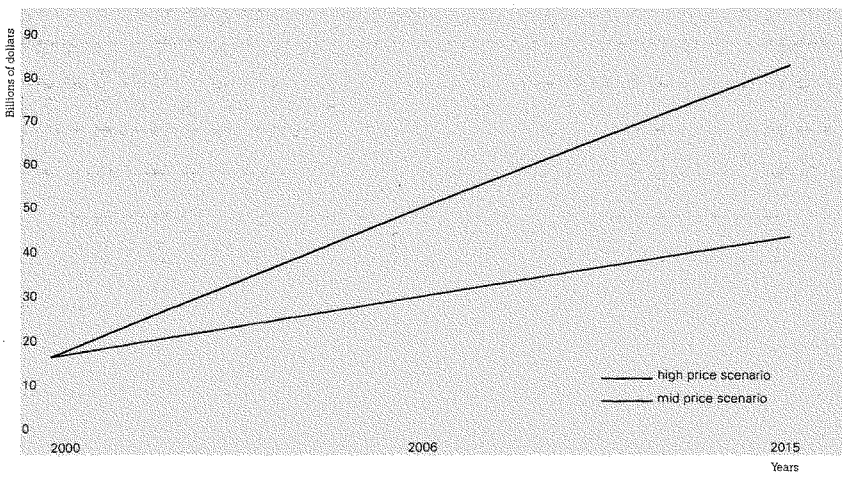
Instead of wasting this money on oil, sub-Saharan Africa would be better served if it switched to renewable energy. According to some forecasts, it would cost Africa considerably less than US$50 billion to adopt a mix of renewable energy technologies to supply its energy needs.[27]

Carbon cost

There is, of course, another cost associated with oil use, which may be far more significant than money alone – carbon emissions.

Christian Aid estimates that if sub-Saharan Africa grows by 7.1 per cent a year – the amount the UN says will be required for it to achieve its MDGs by 2015 – and continues to use oil as one of its primary fossil fuels, it will be pumping an extra 76 million tonnes of carbon a year into the atmosphere by 2015.

Below: Projected total expenditure on oil per year in sub-Saharan Africa[28]



Growth fallacy

More economic growth means more energy use. If this growth is powered by fossil fuels, the increases in carbon emissions will inevitably hurt poor people. The question is whether the benefits of growth outweigh the costs of climate change.

The benefits of growth are not as clear as many might think. DFID and the UK government are strident advocates of the 'growth will reduce poverty' school of development. But there is actually very little evidence underpinning this article of economic faith. Between 1990 and 2001, for every US$100 worth of growth in global per capita income, only US$0.60 found its way into the pockets of poor people.[28] They are bearing the costs of US$100 worth of growth, but only seeing US$0.60 worth of benefits. This does not look like a good deal.

And if growth is powered by fossil-fuel-based energy and increases in carbon emissions, it also – according to the central thesis of this report and an increasing number of decision-makers including Tony Blair – actually *damages* the interests of poor people.

Rather than relying on growth per se to deliver benefits to poor people, the aim should be to encourage growth in those parts of the economy where poor people are likely to benefit – such as small-scale agriculture and labour-intensive industries – and on making sure that they benefit directly from the wealth created. Pro-poor growth ought also to be that which emits the least amount of greenhouse gas and leads to the least climate change.

This means a pro-poor economy is one organised to create jobs and public infrastructure, in which wealth is more equally distributed and which powers its growth with efficient and, wherever possible, renewable energy.

This would make sub-Saharan Africa a significant emitter of greenhouse gases with all the harmful consequences to the climate and poor people that would follow. So while the region should be encouraged to achieve its MDGs, there are concerns over the environmental costs involved.

Should poor countries have the right to develop with fossil fuels given that they did not cause the disequilibrium that now so disadvantages them? In the short term, the hard answer has to be a guarded 'yes'. To say otherwise would be to condemn developing countries to poverty, while allowing the rich and wasteful nations to sit back and enjoy the benefits of a growth that is destroying the atmosphere.

If the Kyoto protocol is adhered to and the US comes on board, the resulting CO_2 cuts may give developing countries 'space' to increase their carbon fuel consumption.

However, this is only a short-term solution. The longer-term answer requires the developed world to continue making significant CO_2 cuts, while poor nations switch over to a mode of development that does not require increasingly expensive and damaging fossil fuels.

When the Kyoto protocol expires in 2012, there will be an urgent need for an international agreement to replace it, that sets new and more stringent emission targets. Any such agreement should also include the larger developing nations, such as India, China, Brazil and South Africa.

Carbon fix

The key for poor countries wanting to grow out of poverty without harming the environment, is what development agencies have been discussing for decades, namely 'sustainable development'. The best definition of this in a climate change context is perhaps: 'that development which meets the long-term needs of poor people, while safeguarding finite natural resources for future generations.'

This means producing food and other goods and services without overusing scarce resources, such as water or wood. It means not damaging the land or watercourses or atmosphere with toxic substances. It means not wasting precious commodities.

Christian Aid supports many organisations across the world that practise precisely this type of approach. Farmers who conserve seed, herders who practise good husbandry, fishermen who use traditional methods that don't deplete stocks are all examples of the kind of work that happens already, and indeed, in some cases, has happened for millennia.

Improving all of these activities requires increased levels of energy. So too does improved transport, education, healthcare and just about any primary service that one can think of – all of which need to be enhanced if the MDGs stand a chance of being reached.

In sub-Saharan Africa, oil fuels most of these activities.

It is not noble or interesting to live without power... Yet nearly one-third of the world's population are 'off-grid'.

Crude oil still dominates energy production in Africa, though its share has declined: in 1970 it constituted 86 per cent of energy production, with coal, gas and hydro constituting 11, 2 and 0.5 per cent respectively. But in 1997, oil had declined to 63 per cent, while coal had increased to 19 per cent and natural gas to 15 per cent. Hydro remained static.[29]

Oil accounts for roughly 60 per cent of commercial energy consumption in Africa, with 53 per cent of oil used by transport, 13 per cent by industry and 13 per cent by residential sectors.[30]

Given the terrible costs involved, sub-Saharan Africa, along with the rest of the world, needs to wean itself away from this dependence on fossil fuels. Long the poor relation in any discussion about energy use and development, the time has now come for renewable energy to claim its rightful place at the top of the agenda.

Christian Aid believes that tapping non-carbon sources of power like solar, wind, hydro, biofuels and geothermal, as well as using existing energy more efficiently, is essential if developing countries are to escape the twin dangers of climate change and poverty.

It is no coincidence that the vast majority of the world's 1.6 billion people who do not have access to the electricity grid are poor. If you are wealthy you do not often choose to live without power. Power enables people to do the basic things in life: cook, keep warm, light their homes, feel secure.

It has a host of secondary functions that we, who have power, take for granted. Phones, fridges, machinery, showers, computers, medicines, radios, TVs, fans, torches; a thousand devices need power. Any industry, from farming to hairdressing, benefits from energy. Muscle may be fine for fetching water from a well, but a pump is easier; a kerosene lamp sputtering smoke may allow you to see for a few hours at night, but a light bulb is better.

It is not noble or interesting to live without power. It is difficult and confining and marks you as being down at the bottom of the developmental pile. Yet nearly one-third of the world's population are 'off grid'.

The proportion is far higher in sub-Saharan Africa, where only eight per cent of the rural population has access to electricity, compared with 51 per cent of the urban population.[31]

Here is a breakdown of the average household access to electricity in different African regions:

- Central Africa: 9 per cent
- East Africa: 10 per cent
- West Africa: 17.9 per cent
- Southern Africa: 20.8 per cent
- Northern Africa: 85.8 per cent[32]

Despite the relatively high figures for northern Africa, the 'average' African is still using less energy than the 'average' person used in England in 1875.[33]

One of the consequences of this in Africa and in other poor regions of the world is that people use what they can for fuel, and that is almost always wood. Indeed, Africa's use of firewood and charcoal as energy sources – about 67 per cent of primary energy use – is the highest in the world.[34]

This damages the environment. Trees hold fragile soil together, help prevent desertification, provide an ecosystem for wildlife, suck up CO_2, and provide medicines and building materials.

Another cost of using wood or dung that is rarely taken into account is the physical harm that comes from the smoke they produce. Disturbingly, cooking with biomass inside a house or hut contributes to the biggest single killer of small children in developing countries.

According to a definitive World Health Organisation (WHO) scientific study, around 50 per cent of people – almost all of which live in developing countries – rely on coal and biomass in the form of wood, dung and crops for domestic energy. This exposes mainly women and children to indoor air pollution from stoves every day of their lives.

'There is consistent evidence that indoor air pollution increases the risk of chronic obstructive pulmonary disease and of acute respiratory infections in childhood, the most important cause of death among children under five years of age in developing countries. Evidence also exists of associations with low birth weight, increased infant and perinatal mortality, pulmonary tuberculosis, nasopharyngeal and laryngeal cancer.'[35]

There are, then, compelling reasons why developing countries should switch away from wood, avoid other fossil fuels and switch to renewables.

Later, we will examine the types of renewable energy available, their benefits and some of the difficulties inherent in getting them off the ground.

But first, a tale from Africa.

Solar future – now

Jigawa state is in the far north of Nigeria, on the edge of the Sahel region. It is hot, dusty and remote. Its people are poor and poorly served by their government. Nigeria is rich in oil. It is the fifth richest member of the Organisation of Petroleum Exporting Countries (OPEC), yet this wealth has brought few benefits to Jigawa.

A recurrent feature of life in Nigeria is blackouts – electricity supply is sporadic at best in towns, in villages it is non-existent. There is little expectation that the national grid will reach these villages in the near future, so the government of Jigawa state decided to try something radically different.

In 2001, an American organisation, the Solar Electric Light Fund, joined up with the Jigawa Alternative Energy Fund to use solar power to provide essential services in three villages. Solar energy would be used to provide electricity to 20 households in each village; there would be street lighting and electricity for schools, clinics, a water pump and a business centre. Two technicians are responsible for basic maintenance, such as checking and watering batteries and cleaning the lamps. Senior technicians who visit the villages each month handle more complex jobs.

'We first discussed other possibilities such as coal or biogas,' says Mohammad Sani Muhammad, the executive secretary of the Jigawa fund. 'Solar was the obvious solution. Not only would we be helping economic development, but we would also cut down on deforestation which is such a big problem here.'

Ahoto is one of the chosen three; a remote village more than 100km from Jigawa's forlorn capital of Dutse. Ahoto has about 400 families; they live in large compounds of thatched huts for the extended family. Pigs, goats and chickens also live in the compounds, scrabbling for food around the communal cooking areas. The more fortunate families – 20 in all – now have a three- or five-light solar system.

The head of the village, Garba Bello, is delighted. He has a five-light system in his compound and pays about 600 naira (US$4) a month.

'The difference is great,' says Garba. 'People now go out at night and chat. Before, you could not even see your neighbour's house in the night. It is also good for the women because there are classes for them at night in the school.'

But the real difference is in the bustling shopping area – along the dusty path that leads from the school to the mosque is a newly constructed block with six rooms. Each houses a different business and when darkness falls, this is the social and economic hub of Ahoto.

'Before, we had to work at night with a lantern. It was terrible, so much heat and smoke,' says tailor Omar Aliyu. 'Now we have a lot of business, especially before religious festivals.' Omar has done so well he now owns five farms and employs farm hands.

Omar's fellow tailor is Garbe Tela. A football fanatic, he has even made his own football boots complete with a homemade Nike logo. 'Now I even have a fan next to me to keep me cool. Before, I worked in front of my house with a kerosene lantern right up close to the machine. The smoke was horrible.'

Moussa Muhammad, the solar field manager for Ahoto, says the system is so successful that many more households would like to be connected, but the expense is prohibitive. Even this small foray into solar energy costs about ten million naira (US$8,000) per village.

The solar panels are also very vulnerable, which is why local communities need to take ownership of their systems. There are panels on the roof of the concrete business block, but they cannot be installed on the thatched roofs of homes, so they are attached to poles. The panels for the water pump are set out in an enclosed area protected by a 24-hour watchman. Petty vandalism or a severe storm can easily damage a panel.

The water pump is vital for the health of the villagers. For the first time they have access to clean, fresh water. Fifteen household compounds have taps and there are ten communal taps. The pump provides water during daylight hours; the rest of the time it comes from an overhead tank holding 1,000 gallons.

The shops stay open until well past midnight. If it were possible to build another block of shops, there would be no problem filling them with businesses. Auwalal Muhammad decided not to wait; he ran a cable under the sand to his radio repair shop. His shop is piled up with radios waiting to be repaired. 'It was very difficult before,' he says. 'I used a kerosene stove and had to work with live flame and heat. Now I have ten times more business and I am doing so well I even got myself another wife.'

Solar energy has changed the lives of women. Sharia law is strictly enforced in this part of Nigeria and women are not allowed to leave their compounds during daylight hours. Street lighting actually makes life more complicated for them, as they should not be seen at night either, but they manage to skirt around the lit areas. Those lucky enough to have light in their compounds say it is easier for them to care for their children.

'Before, you had to buy kerosene and sometimes you did not have the money,' says Fatima Bello, the wizened mother of the head of the village. 'Now you can work at night, you have no difficulty,

you thank God. You can wash and skin peanuts at night and then they are ready for grinding in the morning.'

But the grinding machine still runs on a generator. The amount of energy required to operate it means using solar power is not cost effective.

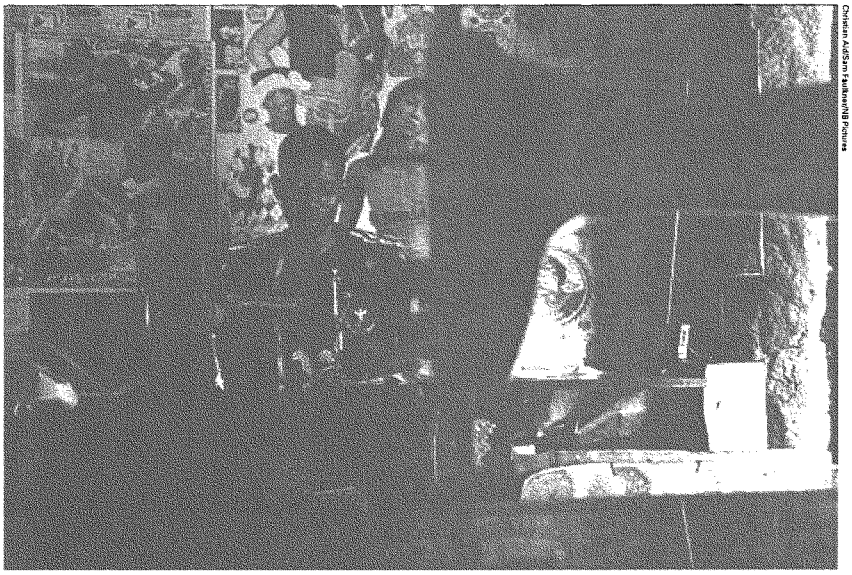
The mosque is vital in this deeply religious village. Set in the centre it holds 200 worshippers inside and for Friday prayers attracts 500 more outside. It has four inside lights and the solar-powered public address system facilitates the call to prayer.

As in all developing countries, Nigeria's young people need to travel to the cities in search of jobs. A guaranteed supply of electricity can change all that. Salisu Ibrahim worked for one year as a barber before setting up a shop in Ahoto's business centre. 'Before, when I used hand clippers, I used to travel all over – to Abuja, Kano and around Plateau state just looking for business,' he says while trimming the hair of a terrified-looking nine-year-old. 'Now I am staying put. I earn enough to look after my wife and child and my parents. Business is very good; people are attracted by modern equipment.'

Solar energy has dramatically changed the lives of these villagers. Economically they are better off, they have access to clean water and education is not limited to daylight hours. The benefits have led the Jigawa state government to approve funds to supply 30 more villages with solar energy. None of these villages are likely to have access to the national grid in the next ten years.

However, without serious research and development, it is unlikely that solar energy can make the leap from isolated villages to towns and cities. Solar energy for a three-bedroom bungalow in the city of Kano costs one million naira (US$800); a generator comes to just half that amount.

Omar Aliya in his tailor's shop in Ahoto, Nigeria. Solar powered electric light allows him to work at night, making all the difference to his business. Before, he had to use a kerosene lantern; the fumes and heat made work very difficult



Christian Aid/Sam Faulkner/NB Pictures

What power?

In Nigeria the renewable of choice is solar power. But for Africa – as elsewhere – the type of energy chosen depends very much on local circumstances.

In hot, dry areas, solar will clearly have a role. While in windy regions – such as South Africa and parts of the Red Sea coast – wind turbines will make more sense. However, winds in sub-Saharan Africa tend to be so light that most of wind energy's potential there lies in powering water pumps rather than generating electricity.[36]

African river systems may yield more power than wind. There are environmental problems with large dams that displace populations and disrupt ecosystems. But systems that draw power from rushing water without disturbing the wider environment are highly efficient sources of power generation. To date, however, less than seven per cent of Africa's massive hydropower potential has been harnessed.[37]

If used sustainably, biomass has enormous potential, whatever the region. Biomass power is derived from vegetation – trees, bushes, grass or crops.

It has great potential to create fuel for cooking, heating and transport. Bio-ethanol (alcohol spirit derived from plants) is already used widely across the world as a substitute for petrol and a means of powering industry. Biofuels give off some CO_2, but far less than oil.

More than 20 per cent of all of Mauritius' electricity comes from a derivative of sugar. It is estimated that up to 16 countries in sub-Saharan Africa could meet a significant proportion of their current electricity consumption in the same way.[38]

On a smaller but still important scale, an energy-efficient charcoal kiln and a cleaner stove for rural and urban households in sub-Saharan Africa has been developed in the past 20 years.[39]

Another renewable power source is geothermal, which involves converting heat from the ground into energy. It has huge potential but is often overlooked. Although only four of Africa's 53 countries have started exploring underground heat sources,[40] the continent has an estimated potential of 9,000 megawatts of geothermal power. (One megawatt could power 1,000 homes in rich countries.) To date, only 123 megawatts of that energy has been tapped.[41]

In reality, it is impossible to say that one type of renewable is the answer to a particular region's energy needs. A combination of all or some of these options is likely to work out best.

Power to the people

Renewables enable people to cook, drill for and pump water; run fridges; store vaccines; light homes, schools, clinics and businesses; power computers and phones; make stills to get drinking water from salt water; and power drying machinery to keep food pristine until it's needed to eat or sell. Indeed, renewable energy can help people perform any number of life-enhancing tasks.

Women are especially likely to benefit. Millions of women in Asia, Africa and South America spend countless hours involved in the drudgery of collecting firewood, hauling water and hand-grinding grain. With power, this could all change.

Renewables do not contribute to greenhouse gas emissions; they are cheaper than oil will become; and they literally empower poor people to climb out of poverty and reach the MDGs. For these reasons renewables are simply the only option that makes sense for poor people.

Given the tremendous advantages of renewable energy, it is legitimate to wonder why developing countries have not already started down this path. But one crucial question remains: can Africa, or anywhere else, get to a position where it can actually profit from renewables?

In some ways, we have been here before. After the last major oil price hike in the 1970s there was considerable talk about renewables but little came of it. The technology was awkward and, in today's terms, not very efficient. And as the price of oil came down, the comparative cost of solar rose.

The focus is now back on alternatives to fossil fuel because of massive oil price hikes and increased concern about climate change. But renewables still present some serious problems.

The first and biggest obstacle has always been price. While the cost of a diesel generator, as in the example from Nigeria on page 20, is substantially less than a single solar panel that delivers less power, it is hardly surprising that most people choose the cheaper, more powerful option.

Today there are many who argue that the true costs of oil are not taken into account. The economic cost of dealing with the environmental fallout of oil is never factored in. But with solar, as with other renewables, you pay for a lifetime's supply up front. If you stretch out the cost of solar power over the length of its use, it begins to stack up economically with fossil fuels.

And solar power seems even less expensive when you consider that, according to some estimates, if the World Bank redirected only one year's worth of its spending on fossil-fuel projects to small-scale solar installations in sub-Saharan Africa, it could provide ten million people with electricity. And all of non-

Christian Aid/Sam Faulkner/INS Pictures

The mosque in the centre of Ahoto, Nigeria. The loudspeakers that call people to prayer are powered by solar energy. The solar lights in the mosque means the Imam can now hold classes in the evening

Ray of hope

The stinking Kibera slum in Nairobi has a reputation for spawning criminals, inter-ethnic violence and misery – not for breeding entrepreneurs and philanthropists.

Almost all of Kenya's 42 tribes are represented here among the one million illegal squatters who live hunched up in densely-packed one-room shacks.

They have no bathrooms. The lucky ones share communal toilets – holes in the ground that empty straight into open ditches where the human waste sits and festers until it rains.

Few residents have electricity. Those that do have often created their own supply. Many sometimes unofficially connect their wires into a neighbours' house to use their electricity. With the plethora of wires snaking in and out of makeshift connections, it can be a dangerous business. Too often, fires sweep through the closely-packed dwellings, killing and maiming.

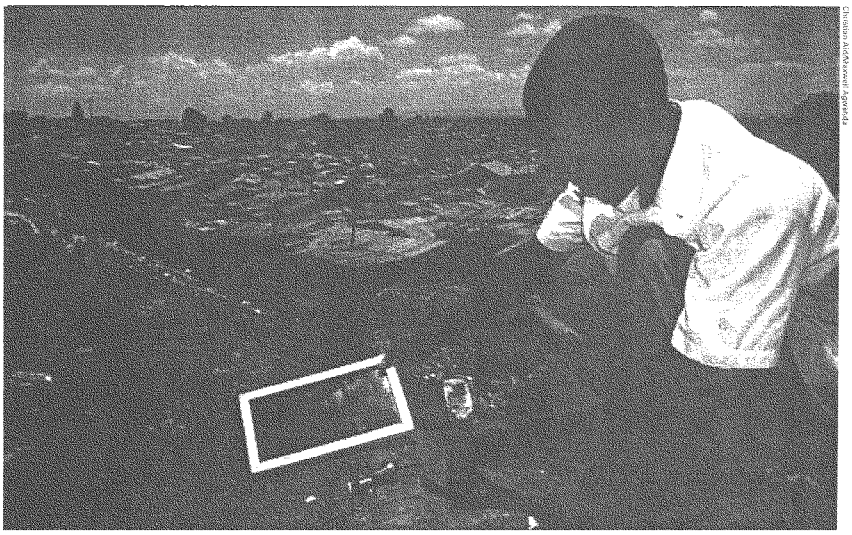
It's not a place where you would expect to find a thriving small business. But the young men and women of the Kibera Community Youth Programme (KCYP) have spotted a gap in the market; they are producing solar power for radios, lights and mobile phones.

The small team work in a ramshackle building on the edge of the slum, making small power packs from fragments of solar panels. The panels are wired up so they can be attached to portable radios – precluding the need to rely on expensive disposable batteries – or to mobile phones for recharging, or even portable lights and torches.

The completed panels are cheap to buy, free to run and need no maintenance. This literally empowers poor slum dwellers. They can use their phones to keep in contact with family, friends and prospective employers and use their radios to keep up with the news or listen to health-education broadcasts.

The solar project makes enough money to pay for itself, fund other projects run by KCYP and give the project members a living wage. The young men and women who came up with the idea – the eldest is only 24 – are all products of the Kibera slum.

One of the organisers, Robert Kheyi, said: 'We



Christian Aid/Kennedy Agyapong

left school with nothing – no qualifications and no future apart from irregular manual work. 'We wanted to do something for ourselves and our community and came up with the youth programme.

'We got the idea for the solar project from a man from Wales who visited us. He told us how to get cheap, small solar panels and how to wire them up. We took it on and we do the marketing.

'Our only problem is that now we can't make them fast enough.'

Robert and his colleagues have a certainty about the value of what they do and the success they know they will eventually share.

They are looking for suppliers who can sell them parts in bulk at cheaper prices. And they plan to take their products beyond Kibera to rural communities across Kenya – and even into Sudan, Senegal, Ghana, Uganda and elsewhere.

'Solar power is safe, it's affordable and it's environmentally friendly,' says Robert. 'We are working on a panel that will charge up a 12-volt battery so that people can run computers and TVs. It takes a day to charge up a car battery. If we can perfect this, we will change people's lives.'

Bottom left: Project organiser Robert Kheyi Ckheyi charges a mobile phone with a mini-solar panel produced by the Kibera Community Programme

electrified sub-Saharan Africa could be provided with energy from small-scale solar facilities for less than 70 per cent of what OECD countries spend on subsidising dirty energy every year.[42]

A massive shift is required, away from subsidising fossil fuels and into renewable energies. Once renewable systems are price competitive with carbon ones, they become an attractive option. They will only become cheaper, however, if these systems are mass-produced and the technology improves.

Fortunately, there are real signs of progress on this front. There has been a substantial drop in the production costs of solar technology in Africa over the past 20 years, reflecting a worldwide increase in solar-cell production. During the 1990s, for example, the photovoltaic (PV) market grew by around 25 per cent[43] – PV being the type of solar system that most people are familiar with, usually a solar panel that converts the sun's light, as opposed to heat, into electricity. In 2004, the solar power business was worth US$7.5 billion and is currently growing by more than 30 per cent per annum.[44]

Solar technology has improved enormously. Second- and third-generation PV panels and roof tiles now charge up faster, are cheaper and last longer. PV solar power is also best-suited to smaller, off-grid houses and settlements, precisely where most agrarian poor people live.

Off-grid systems tend to be far more efficient than the large power stations that provide energy for grids. These power stations use coal, gas, oil or atomic energy to heat water that drives turbines to produce energy that is then distributed across the grid – but this system is riddled with inefficiencies. In the UK, for instance, 65 per cent of the energy produced in power stations is lost before it reaches businesses and homes because the heat generated during the process is lost and energy leaches away during its transmission across the national grid.[45]

Generating power close to where it is used, to reduce losses during transmission and so that the heat as well as the electricity generated can be harnessed, is a far more efficient way of producing energy. A good example of this already exists in the UK.

Woking Borough Council in Surrey, south-east England, has adopted a climate change strategy and has reduced carbon emissions in council buildings and its stock of properties across the borough by 77.4 per cent against 1990 levels. It has achieved this by generating power close to where it will be used, harnessing the heat as well as the electricity generated and using solar and fuel-cell technologies where possible. Woking funded its energy investments by recycling the money saved through increased energy efficiency.[46]

But if renewables are ever to genuinely replace fossil fuels, there will also have to be large-scale power for industry. Until recently this was not technologically possible, but advances in another type of solar power seem to indicate that this too could be achievable.

'And now we face a crisis with unprecedented danger that also presents an opportunity like no other.'

Al Gore, former US vice-president

Concentrated solar thermal power derives energy from the sun's heat (as opposed to light, as in the PV model). These are large systems that require serious amounts of land and sunshine to work. But once they do, they become comparable with oil- and coal-fired power stations.

Concentrated power is still a young technology, but power stations have already been built in California and many more are about to begin production in India, Algeria, Egypt, Morocco, Spain, Mexico, Italy, Greece and elsewhere.[47]

According to Greenpeace, solar thermal power is capable of supplying electricity to 100 million people across the world within just two decades.

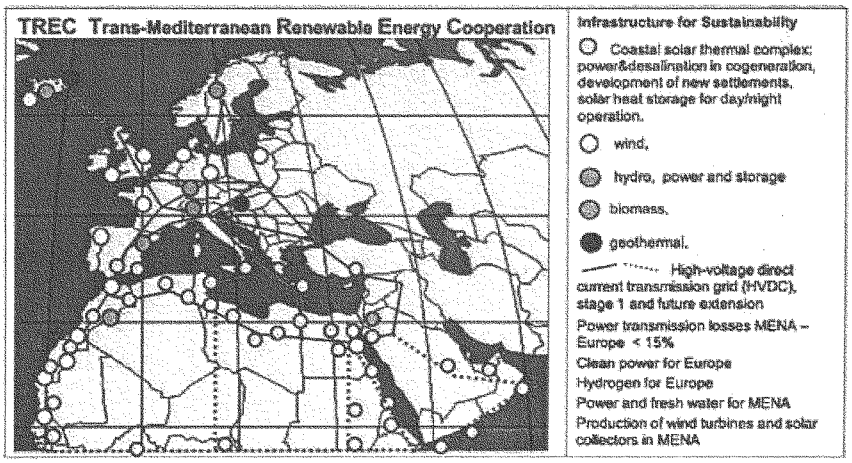
Greenpeace has calculated that: 'In many regions of the world, one square kilometre of land is enough to generate as much as 100-120 gigawatt hours of electricity per year using solar thermal technology. This is equivalent to the annual production of a conventional 50 megawatt coal- or gas-fired mid-load power plant. Over the total life cycle of a solar thermal power system, its output would be equivalent to the energy contained in more than five million barrels of oil.'[48]

World power – from Africa

Some forecasters have envisaged giant concentrated solar-power and hydro-thermal stations across the Middle East, parts of Europe and North Africa powering the whole of Europe (see map, below). But if Europe could be powered from Africa there is no reason why Africa could not power itself.

The environmentalist Club of Rome was one of the first organisations to argue that finding alternative energy sources was a necessity given the finite nature of fossil fuels. One of its offshoots, the Trans Mediterranean Renewable Energy Cooperation (TREC), has produced a blueprint for renewable power.

It says both technically feasible and affordable forms of renewable energy already exist and far surpass humanity's needs: 'By far the largest potential is the direct solar energy radiation onto deserts. If deployment of concentrating solar power plants – a technology in operation since 20 years – were to grow by 25 per cent per year, which is technically, economically and logistically feasible, then within 40 years we could achieve much of what needs to be done to provide affordable, reliable and secure power for the world-wide needs, and to stabilise the world's climate.'[49]



Source: Trans Mediterranean Renewable Energy Cooperation

There are other exciting developments waiting to happen. Scientists in the US are developing a flexible, photovoltaic, paint-like substance that can be applied to large and small surfaces alike.

Others are examining nanotechnology, the use of microscopic engineering to emulate the natural world. Plants do two things that human beings are struggling to copy: they use sunlight to convert carbon dioxide and water into sugar and oxygen; they also store the sun's energy overnight. They both eliminate a greenhouse gas and overcome one of the biggest drawbacks of any man-made solar system, namely that it stops working when there is no light. But so far man's attempts at storage are cumbersome beside the power of plants.

There is still some way to go, but it does not seem entirely fanciful to imagine that solar power could take off as fast as other new technologies. Mobile phones were virtually unknown in Africa 15 years ago and now have almost replaced existing, terrestrial phone systems.

Even as things stand, the cost of solar power may not be beyond Africa and the international community. For example, one estimate calculates that providing solar electricity to a village of 50 households would cost an average of US$25,000.[50] Assuming conservatively that the average household size in sub-Saharan Africa is five people, this works out at a cost of about US$100 per person.[51]

If one multiplies this by the number of people in sub-Saharan Africa without electricity – about 500 million – it works out at about US$50 billion.[52] This figure compares favourably with the amount the region is likely to have to spend on oil over the next decade.

In the industrialised world, the market is the main driver for expansion. But while it has an important role to play, it would be irresponsible to leave the ushering in of a new age of renewable energy solely to the market.

We all have a stake in moving beyond fossil fuels as swiftly as possible and it is imperative to use any and every mechanism to hand in both the state and private sector.

Governments of rich countries must intervene to fund research and development on renewables. At the same time, the World Bank and International Monetary Fund must swiftly increase their funding of the renewable sector in poor countries.

Meanwhile, rich-country governments must phase out the massive public subsidies they give to fossil-fuel industries. In the last decade, industrialised countries on average gave the oil industry a massive US$73 billion in subsidies per year during the late 1990s[53] – roughly equivalent to the global aid budget.

Only with the state and market working in tandem will the economies of scale needed to bring cost down happen sufficiently quickly. Only with the whole of society operating in concert will we ever get the type of power system that poor people need and, ultimately, we all so urgently require.

Former US vice president Al Gore has written extensively about the environmental crisis. Like Christian Aid, he too sees that as well as terrible risks there are real prospects for a better world that arise out of global warming.

As he puts it: 'And now we face a crisis with unprecedented danger that also presents an opportunity like no other. As we rise to meet this historic challenge, it promises prosperity, common purpose and the renewal of our moral authority. We should not wait. We cannot wait. We must not wait.'[54]

Kenya: drought and conflict

Christian Aid/Jon Mitchell

Elim Lokeris, 45, was shot in the back and had his stomach slashed open by raiders who stole his entire herd of 380 animals. He was hospitalised for two years

Once Sambarwawa had water, now it has bodies. Following prolonged drought, animal carcasses litter the valley and the stench of decay pervades the remote village of Sambarwawa in the heart of the northern Kenyan district of Isiolo.

But Sambarwawa is not only a graveyard for the animals of local livestock farmers. Some of these nomadic herders – known as pastoralists – have also died because of the drought; not from starvation or thirst, but as a result of escalating conflict in the area. They were murdered for their water.

Sambarwawa is a place where groups of pastoralists congregate in times of drought. Each group is allocated a space on the dry river bed to drill a borehole for water. They are allowed to bring their animals to drink here once every four days. 'It's a sort of cafeteria system to ensure everybody has a chance to get water for their animals,' says local leader Wako Liba.

But the system has been under extraordinary strain for years because of almost a decade of drought.[1] By December last year, some 10,000 herders with 200,000 animals had descended on tiny Sambarwawa, many trekking 400km from the epicentre of the drought in the east. Although the village had not seen rain for a year, they knew they could still find water under the riverbed. But then the boreholes began to dry up.

'As the water level dropped, I foresaw conflict,' says Liba. 'Some herders started encroaching on boreholes owned by different communities. As one group pushed to water its livestock, another moved to restrict access to the few boreholes that had enough water.'

In December, as the drought intensified, the pressure finally led to killings.

'Gunshots reverberated the whole night,' Liba recalls. 'By the time I came down, seven people had died. There were dozens of injuries. Animal carcasses littered almost a kilometre stretch of the valley.'

David Kheyle, 37, was queuing for water when fighting broke out. 'There was grumbling that evening. A good number of boreholes didn't have water so the queues were relentless,' he says.

'People were becoming impatient. Suddenly there was a scramble at the northern end of the valley... it was a free-for-all. But it later took on an ethnic dimension when people aligned with their kind to defend themselves.'

Over the next 40 days, there were another four violent incidents that left at least two more people dead, according to government officials. More than 3,000 animals – pastoral communities' only assets – were stolen.

Arkan Athan Hussein, a lanky 18-year-old herder, was injured in one of the incidents while tending his family's livestock. His friend, Abdi Maalim, was killed.

'Six armed people emerged from nowhere. They wanted us to help them drive their livestock to the watering point. We couldn't do that. The use of boreholes is restricted so we couldn't push through someone else's herds.

'As we resisted, one of them raised his AK-47 and shot Abdi in the chest and shoulder. As I fled, they shot at me.'

Arkan's father, 70-year-old Ibrahim Hussein, says that in the 40 years he has been coming to Sambarwawa, this is the first time there has been such violence. In response, the authorities have set up a police post manned by 12 specially-trained officers. But the area remains tense. The link between drought and conflict is widely recognised in Kenya.

Edwin Rutto of the Africa Peace Forum monitors violent incidents in the country. He says that there is an 'established correlation between drought and violent conflict... During times of drought, conflict between communities over water and pastures increases.'

It is a view echoed by Professor Richard Odingo, vice-chairman of the UK's Intergovernmental Panel on Climate Change (IPCC), who has published work on drought-related conflict in north-eastern Kenya.

'During a period of drought, the strongest survive,' he says. 'It's survival of the fittest. You have a lot of conflict because of that. It is related to the struggle for resources, especially water and grazing.' As the climate changes, say experts that Christian Aid interviewed, this is certain to get worse.

Recent drought has also triggered violence between communities in Naivasha's Mai Mahiu area, 90km north-west of Kenya's capital, Nairobi. In January and February 2005, 22 people were killed and more than a dozen hospitalised in fighting over a water point on Ewaso Kedong river. When farmers diverted water to irrigate their farms, Maasai pastoralists living downstream illegally occupied their land, stole livestock and destroyed waterpipes in protest.

The Maasai were desperate for water because Kajiado district, where they live, had received less than 20 per cent of its usual rainfall during 2004 and 2005.[2] The violence took on an ethnic dimension, as gangs from different tribes staged revenge attacks, pulling Maasai passengers out of buses and killing them with machetes, spears and arrows.

Conflict over access to water, grazing and land has resulted in extreme violence between Borana and Gabra pastoralists in Kenya's Marsabit district, near the Ethiopian border. On 12 July 2005, 56 people, including 22 primary school children, were

killed in Turbi village. Another 20 people died in revenge attacks as Borana passengers were pulled from buses and murdered.

The problem has even begun to cross international borders, raising the fearsome spectre of war. In recent weeks, drought has caused conflict between Ugandan and Kenyan pastoralists. And Ethiopian troops have moved into parts of northern Somalia to stop Somalis crossing the border in search of pasture and water for their livestock.

Climate change

As part of his work for the IPCC, Richard Odingo has been monitoring climate change in Africa. 'We have rather frightening evidence. If you go back 50 years, climate is changing and is changing fairly rapidly for the worse,' he says.

The melting of the glaciers on Mount Kenya provides the clearest evidence of climate change. 'The glaciers on Mount Kenya have always been there,' he says. 'They have fluctuated during periods of drought. They have come back during periods of heavy rain. But for the first time we are seeing almost the disappearance of the glaciers.'

Professor Eric Odada, the regional director for climate change research in Africa at the Paris-based International Council for Science, argues that the melting of the glaciers on Mount Kilimanjaro, just across Kenya's southern border with Tanzania, will have further devastating implications for some of Kenya's most fertile lands. They provide the source for many local rivers, but they are disappearing. Professor Odada warns that rain-fed lakes will dry up, hitting some of the most populated parts of east Africa.

'Cities like Mombasa [Kenya's second largest city] will be put in a difficult situation because [it] is getting water from Mzima Springs which is fed by the glaciers on Mount Kilimanjaro,' he says.

The rapidity with which glaciers are melting shows that Kenya is getting warmer. This is confirmed by measurements on the ground. For example, the maximum temperature in Kericho, a highland area in the Rift Valley province where most of Kenya's tea exports are grown, has increased by 3.5°C during the past 20 years.[3] In Lamu, on Kenya's north-eastern coast near Somalia, the maximum temperature has increased by more than 3°C since the 1940s.[4]

Peter Ambenje, head of forecasting at Kenya Meteorological Department, says: 'There seems to be increased frequency and intensity of severe weather and extreme climate events. Just by looking at rainfall patterns for the last 25 years... severe drought... seem[s] to be becoming more prevalent. We can [also] see very high variability in rainfall.'

Dr Jesse Njoka of the University of Nairobi is an expert on the ecology of Kenya's arid and semi-arid lands. His analysis backs up Ambenje's observations. 'The beginning and end of the rains are no longer that predictable,' he explains. 'Even drought within the rainy season is an issue. For example, we always expect rains to start at the end of March. Now they are predicted for April. We expected grass rains [rains which allow grass to grow] in the middle of February and now it appears the rains we had in March are grass rains.'

The implications are serious. Crops die during these prolonged dry spells and animals have no grass to feed on and perish.

Poverty and climate

In Kenya, where 56 per cent of the population live on less than US$2 a day, it is the poor who will be hardest hit by climate change.

Pastoralists are among the poorest and least educated people in Kenya. They spend their lives traversing the arid and semi-arid lands that make up 80 per cent of the country, looking for water and pasture. Most of the herders in Sambarwawa have never stepped inside a classroom and cannot speak either of Kenya's national languages, English or Swahili.

With the recurring droughts brought by climate change, poor pastoralists are stuck in an ever-tightening poverty-trap. 'After people go through a period of relative recovery, then another drought hits. People are living in a state of perpetual suffering,' says Edwin Rutto of the Africa Peace Forum.

If the climate cannot sustain you, then you tend to spend a lifetime careering from crisis to crisis, periodically relying on emergency aid. This is undermining the government's development efforts. 'It is extremely expensive to feed people. The government has diverted all its development money to emergency money,' says Fatuma Abdikadir, national coordinator of the government's Arid Lands Resource Management Project.

People are left with very few choices when drought strikes – women and children fewest of all. As Dominic Kariuki of the peace-negotiating organisation Chemchemi Ya Ukweli puts it, 'You can't sell your animals – you don't have [any]. You can't sell your labour – you don't have skills. So you are left with your body.'

Prostitution has fast become not just the last but the only resort for many women and children – some as young as seven, according to Kariuki. He says: 'They have lost their relatives. They are on their own. There is nobody to protect

'After people go through a period of relative recovery, then another drought hits. People are living in a state of perpetual suffering.'

Edwin Rutto of the Africa Peace Forum

them. They come to work almost as slaves in urban centres where they work for food and nothing else. When those jobs are not available and they are getting used to urban life, they broaden their survival skills.'

War

Prospects for the future are grim. Experts agree that conflict is likely to become more widespread, particularly as water shortages worsen. Cross-border conflict in the Horn of Africa, already existing on a small-scale, is likely to escalate.

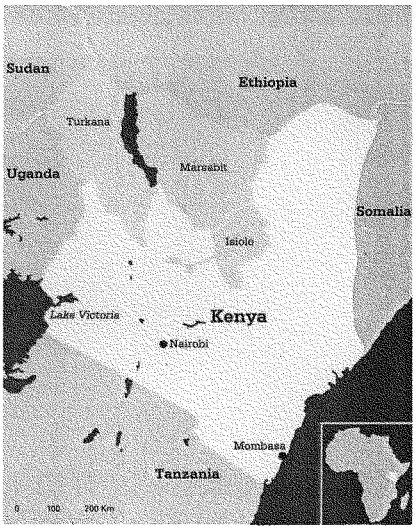
Traditionally, young men in pastoralist groups attack their neighbours to steal their cattle. This is part of the culture of communities like the Turkana and Pokot from Kenya, the Karamajong from Uganda, Toposa from Sudan, Oromo and Merille from Ethiopia and numerous Somali clans. But these raids have become increasingly deadly in recent years with the influx of cheap guns from nearby war zones. Communities are becoming caught up in an endless cycle of revenge attacks.

Nomads are used to crossing borders in search of scarce water and pasture. As drought tightens its grip on the region, the pressure to search for water is intensifying, leading to armed violence and deaths. In March, for example, Kenyan Pokots raided a Ugandan settlement, killing 16 people. In retaliation, the Ugandan army sent in a helicopter to pursue the Pokot raiders. Increasingly, soldiers are being used to protect communities, for example, around Soroti in eastern Uganda. A military response is one small step closer to state-backed conflict – or war.

Water shortages could also lead to conflict between Kenya and Ethiopia. Kenya's arid Turkana district, which borders Ethiopia, has only two sources of freshwater – the Turkwell and Omo rivers. The Turkwell, in Kenya, has been dammed to generate electricity, reducing its flow downstream. The Omo originates in the Ethiopian highlands.

Professor Eric Odada of the International Council for Science, says: 'On the Ethiopian side, they're now diverting this water for irrigation and very little is coming into Lake Turkana. Turkana people are now very worried because [the river] is turning saline. The lake level has dropped by 60 metres over the last ten years.'

Another likely water war is over the River Nile which flows through Sudan to Egypt and the Mediterranean Sea. Lake Victoria, in western Kenya, is one of its sources. Yet, under the rules of a treaty drawn up by British colonialists, Kenyans are not allowed to use the water for irrigation. Only Egypt, further downstream has this right.



Peace negotiator Dominic Kariuki says: 'Due to that treaty, which was written without our consent, some people are dying of drought in Kenya. Conflict will explode as the water lessens. If it's not worked out that we share the little that is there, then people will start fighting. It's just a matter of time.'

Experts are increasingly concerned about the widening impacts of climate change. Professor Eric Odada foresees a 'doomsday' when 'there will be mass migrations by people from Africa in search of food'.

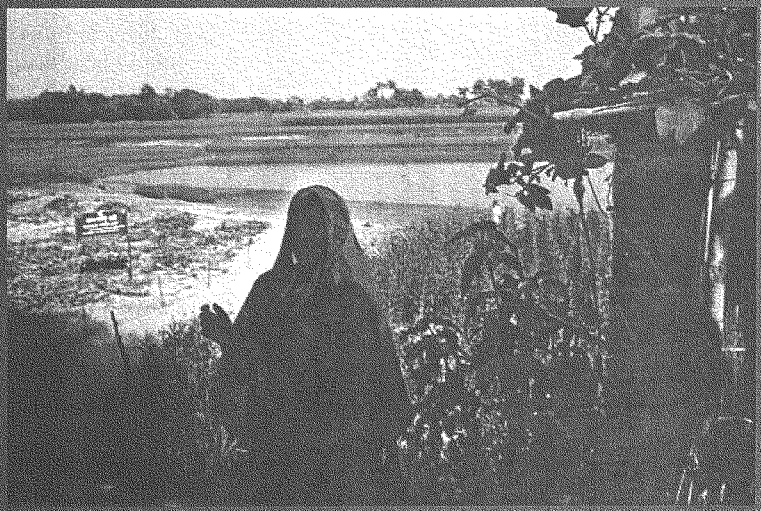
'Europe should be prepared,' he says. 'We are either going to prosper together or perish together when climate change comes. They should not think that the barrier between Morocco and Spain will stop people from the south moving into Europe.'

'Of course I am worried about the future for those who live and work on our coastlines. There is a disaster coming and all that we can do is try to make people better able to cope.'

Dr M Rafique Islam of the Bangladesh Intergovernmental Coastal Zone Management body

Bangladesh: erosion and flood

Mazeda Begum, 35, from northern Bangladesh, stands in front of her home on a raised flood-protection embankment. She sent her nine-year-old daughter to the capital Dhaka to work as a servant, as the family could not afford to feed her after they lost their home and land six years ago because of river erosion



Christian Aid/Mark Fisher

Mazeda Begum's eyes well with tears as she describes how desperate poverty forced her to send her nine-year-old daughter to work as a servant in a strange city hundreds of miles away. That was five years ago and Mazeda has only been able to see Shada Rani once a year since.

'I think she is being well looked after and she is getting enough to eat, which is more than I could provide for her,' she says as she sits on the ground in the shade of a banyan tree.

Mazeda, 35, had spent her whole life in Balashighat, a village in the Gaibandha district of northern Bangladesh, until the river Tista began to erode the land she lived on. For three years in a row, she and her husband and three children were forced to abandon their house and build a new shelter further back from the crumbling riverbank.

Then, in 2000, the river finally swallowed all that remained of their small plot of farmland. Saving only what they could carry, the family had to flee by boat to a raised embankment a kilometre away, built by the government to protect a nearby town from floods.

Ever since, they have lived on the seven-metre high, five-metre wide embankment which winds through waterlogged paddy fields, camping alongside 200 other families who also lost their homes to river erosion.

For the first few days after they arrived they sheltered under a tree, using plastic sheets to keep off the heavy rain. A few weeks later Mazeda's husband built a house with palm leaves and straw. But without their land, where they used to grow wheat, rice and jute, they had no way of earning an income. So Mazeda decided to send Shada Rani to Dhaka. 'I had no choice but to send her as we could not afford to feed the whole family,' she says. 'I did the right thing for her.'

Coping with erosion

River erosion and flooding are part of everyday life in many areas of Bangladesh. Most of the 200 families on the embankment have moved two or three times because of erosion and some say they have had to move as many as ten or 11 times during their lives.

They also say these events have become more common in the past few years. 'Before, my father could predict how the river would change course over the years. But now it happens too fast for us to be able to predict,' Mazeda says.

Surveys conducted in villages and rural areas show that people in Bangladesh are aware that their weather patterns are changing, even though they may not understand why, and many are worried.

They are right to be. Bangladesh will be one of the countries hit hardest by climate change. More frequent floods, erosion and rising sea levels could reduce its landmass by more than a fifth, forcing millions of people to leave their homes and migrate in search of food, water and shelter.[1] Climate change could also cause droughts in some parts of the country and lead to more and stronger cyclones.

The Tista is one of 230 rivers that criss-cross the country. Further downstream it becomes the Brahmaputra, one of three great rivers – the others are the Ganges and the Meghna – which together drain 175 million hectares of land.[2]

The outflow of water from Bangladesh is the third highest in the world after the Amazon and Congo systems. Although it is only the size of Greece, as much water flows through the country as through the whole of Europe. And with more than 140 million people, Bangladesh is among the most densely populated agricultural nations in the world. People must use every available piece of fertile land, including riverbanks – where they are at greater risk from flooding.

Each year during the monsoon season, which runs from July to September, roughly a fifth of the country is flooded. People have become used to coping with the inundation. In fact they welcome this regular flooding as it deposits essential nutrients on the soil, allowing them to grow crops year after year.

River erosion is also a natural process caused by the scouring action of the water as it flows downstream. Also, as floodwaters recede, the riverbank often breaks up and tens of metres of land can be washed downstream. At the same time deposits of silt can create new land, which is particularly vulnerable to erosion.

Although flooding and erosion are nothing new to the people of Bangladesh, the past 20 years have seen the incidences of both intensify. In 1987, 1988, 1995, 1998 and 2004, severe floods left vast swathes (more than two-thirds in 1988 and 1998) of the country under water. The 2004 floods destroyed 80 per cent of the country's crops, killed 747 people and left 30 million homeless or stranded.[3]

A good number of scientists and non-governmental organisations working with flood and river-erosion victims are certain that climate change is increasing the frequency of floods and the speed of erosion. Others agree that weather patterns are changing but are more circumspect about drawing a direct link between climate change and more erosion or floods.

'We simply do not know if climate change is definitely increasing the erosion by our rivers. There are many complex factors involved,' says Dr Atiq Rahman, executive director of

'Forget about making poverty history. Climate change will make poverty permanent.'

Nazmul Chowdbury from Practical Action

the Bangladesh Centre for Advanced Studies (BCAS), a Christian Aid partner organisation and the country's leading environmental research group.

But, he adds, 'what we can say is that patterns of rainfall and flooding have changed in the past few years. Severe floods used to come once every 20 years, but now seem to occur around every five to seven years. This could very well be linked with climate change.'

But while the debate continues over whether Bangladesh is already feeling the effects of climate change, the forecast of what is to come for the country is indisputably dire.

Predictions

Climate models developed by the Intergovernmental Panel on Climate Change (IPCC) indicate that Bangladesh could experience ten to 15 per cent more rainfall by 2030.[4]

This heavier rainfall will flood between 20 and 40 per cent more land than today, according to Monirul Qader Mirza, a Bangladeshi water-resources expert within the University of Toronto's Adaptation and Impacts Research Group.[5]

This flooding will be exacerbated as increasing global temperatures melt more snow in the Himalayan mountains in Nepal and India each summer. Already studies have shown that the Himalayan glaciers are retreating at a rate of about ten to 15 metres per year.[6] The huge amount of water created runs into rivers, many of which eventually flow through Bangladesh on their way to the sea.

At the same time higher sea levels and higher tidal surges caused by more intense cyclones – which are also predicted to become worse with climate change – will decrease the rate at which water is discharged into the sea. This 'back-water effect' means floodwater will continue to accumulate, inundating more parts of the country and increasing the depth and area of flooding in those places already affected.

'Anything which increases the flow of water through the rivers – such as more rain, more glacial melt or higher sea levels – will cause more river erosion and more flooding,' says Dr Rahman from BCAS. 'The amount of water coming from the Himalayas is huge and flows through the three main rivers which end in the Bay of Bengal.

'When the sea level is higher, the flow of that water will be restricted and it will only be able to spread sideways which means more severe and prolonged floods. Bangladesh is already a flood-prone country but it will become much worse in future.'

However, eventually if the glaciers melt completely, runoff will decrease rather than increase, leading to water shortages rather than floods.[7]

Nazmul Chowdhury, from UK-based development agency Practical Action, runs a project that helps Mazeda and those like her who have lost their land find permanent homes and new ways of earning a living. He is in no doubt that floods and river erosion are getting worse and that this is linked to climate change.

'The intensity of the floods is increasing year by year and the river erosion is happening much more in recent years,' he says. 'Of course the people who are facing the brunt of this process are the villagers who are poor to start with. Now they are in an even more vulnerable situation. Forget about making poverty history. Climate change will make poverty permanent.'

Flood victims get some support from the government. But those affected by river erosion get very little financial compensation, even if they permanently lose their home or land, according to Charles Sarkar of Christian Aid partner the Christian Commission for Development in Bangladesh (CCDB). 'They have nowhere to go and end up living on relatives' land or by the roadside or on embankments,' he says.

CCDB estimates that each year a million people are displaced by river erosion, many permanently. But this would be nothing compared to the numbers who may have to migrate in the future. Experts have forecast that climate change could result in 150 million environmental refugees by 2050, including around 15 million from Bangladesh.[8]

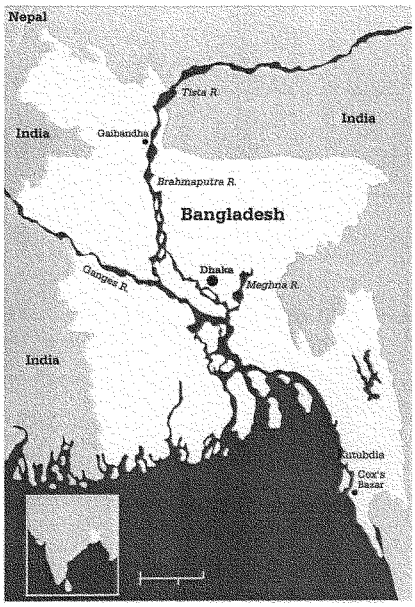
Encroaching seas

Most of Bangladesh is less than ten metres above sea level.[9] A rise in sea levels of between nine and 95 centimetres by the year 2100 – which is towards the top end of the IPCC's predictions – would leave about 18 per cent (or 25,000 square kilometres) of Bangladesh under water.[10]

About 35 million people live in the country's coastal areas[11] and many could be forced to migrate inland as sea levels rise. This will put pressure on non-coastal areas, where land is scarce and the population density already high – and where climate change could already be causing more flooding and erosion.

Scientists also predict that global warming will increase the frequency and intensity of tropical storms. If the surface temperature of the sea rises, cyclones – which already hit Bangladesh regularly, with devastating consequences – are more likely to form.

The island of Kutubdia, just off the coast of the southern



district of Cox's Bazar, has shrunk by half in less than 50 years because of coastal erosion, according to the Coastal Association for Social Transformation (Coast) Trust. In 1959 it covered an area of 36 square kilometres, but in 2005 was just 18 square kilometres, according to Coast, which has analysed maps from the Bangladesh Water Development Board.

Much of the erosion happened as a result of a devastating cyclone in 1991, which killed 140,000 people across Bangladesh, including 22,000 in Kutubdia. But erosion also occurs every year during the high monsoon tides. A government-built embankment has held off the erosion in recent years. But where the embankment does not exist or is broken, the sea continues to swallow up land.

In June 2005, Pancha Bala saw her home broken apart by the waves. Sand covers the place where the house stood and where she used to sleep is now part of the beach.

Pancha, 45, whose husband died of cancer a year ago, says that when she moved into the bamboo house about quarter of a century ago, the sea was nearly 1km away. 'I had lived in the house for many years. It was destroyed in the cyclone in 1991, but we rebuilt it on the same spot,' she recalls.

'Over the years the sea was coming closer and closer, but in the end the waves took it in one night. The waves and rain started at ten in the morning. That first day, the kitchen was washed away. We thought we might drown, so we left.' She took her six children to her sister-in-law's house further inland, but the final memories of her home still haunt her.

'I didn't sleep at all that night. The wind was howling and I could hear the roar of the sea. I was only thinking about the future and how we would live. When it became light I went outside and could not even see my house. It was covered by the water. I just sat and cried. Still I am angry with the sea for destroying my house.'

There is anecdotal evidence that the rate of erosion has increased in Kutubdia in the past few years. The Coast trust estimates that if the erosion continues at the same rate, Kutubdia will vanish from the map completely in 70 years, forcing the remaining population of around 150,000 to find shelter and work elsewhere.

Again, the factors involved in coastal erosion are complex. But if sea levels rise, tidal surges are likely to be stronger which increases the rate of erosion.

'Over the last 20 years erosion has increased in coastal areas,' says Dr M Rafique Islam, leader of Intergovernmental Coastal Zone Management (ICZM), a body which advises the government on coastal issues. 'Why exactly this is happening we are not sure, but certainly climate change is something that we believe is one of the factors.

'As climate change gets worse, coastal erosion will get worse. Of course I am worried about the future for those who live and work on our coastlines. There is a disaster coming and all that we can do is try to make people better able to cope.'

Work is already underway to mitigate the effects of climate change and help those at risk adapt. Many of Christian Aid's partners in Bangladesh help the victims of river and coastal erosion and flooding, training communities to prepare for future disasters.

CCDB and Gonoshasthaya Kendra (another Christian Aid partner) have built numerous multipurpose cyclone shelters in the country's coastal areas and islands. They and other partners, including Gono Unnayan Prochesta, the Church of Bangladesh and UBINIG also build raised platforms to provide shelter for

people and livestock during emergencies, and help communities diversify their crops and find alternative employment.

During the 2004 floods, Christian Aid and seven partners successfully worked together to respond to the emergency, helping more than 100,000 families. The same group is a leading member of a new five-year Christian Aid project called Building Disaster Resilient Communities, which aims to reduce vulnerability to future crises in six different countries.

Far from home

Although Pancha has only left Kutubdia twice in her life, she says she will soon have to move away from the island. 'We cannot stay with my sister-in-law forever. We have no house, no land and no money,' she says.

This year, Pancha's 24-year-old son decided to move to Kutubdia Para, a slum area of Cox's Bazar on the mainland. It is home to around 20,000 people from the island who lost their homes after the cyclone or because of erosion.

Nur Hussain is among them. He left the island where his family had lived for generations, after losing his house. During the monsoon of July 2005, heavy rains and two-metre-high waves lashed the island. Within the space of 24 hours, Nur's house and the land it stood on had gone.

'I did not know how my family would survive or where we would live. I was filled with despair. The sea had swallowed my home,' he says.

The family stayed with relatives for six months until they made the hard decision to move to the mainland. 'Kutubdia is my home, my motherland,' says Nur, 'but I had to leave. Sometimes I cry for what I have lost.'

Others are facing different problems that seem to point to climate change.

A rise in sea levels will enable saline water to intrude further inland during high tides and salt in the groundwater will increase, leaving fields near the coast useless for farming, according to Dr Rahman from BCAS. On Kutubdia and the mainland, there are signs that this is already happening.

Saiful Islam used to grow rice on his farm near Moghnama village in Cox's Bazar district. Gradually his rice production decreased until, eventually, the rice seedlings failed to grow at all because of the increased salinity of the land.

'Now I cultivate salt because nothing else will grow,' he says as he scrapes his fresh 'crop' across the plastic sheeting laid out over his fields, which are around 1.5km from the sea.

'Salinity is increasing in land near the coast,' says ICZM's Dr Islam. 'Some people blame contamination for this – that as one person cultivates salt on their land, saline water will move into neighbouring fields. Contamination can be a localised issue, but that could not cause the big shifts that we are seeing now.'

Mazeda, Pancha, Nur and Saiful have never heard of the terms climate change, global warming or carbon dioxide emissions. They have never even been in a car. But it is people like these – who are already the most vulnerable – that will be hardest hit by climate change.

As Rezaul Karim Chowdhury, executive director of Coast, says, 'It is the rich that cause climate change and it is the poor here in Bangladesh who will pay the price.'

Christian Aid/Anjali Kwatra

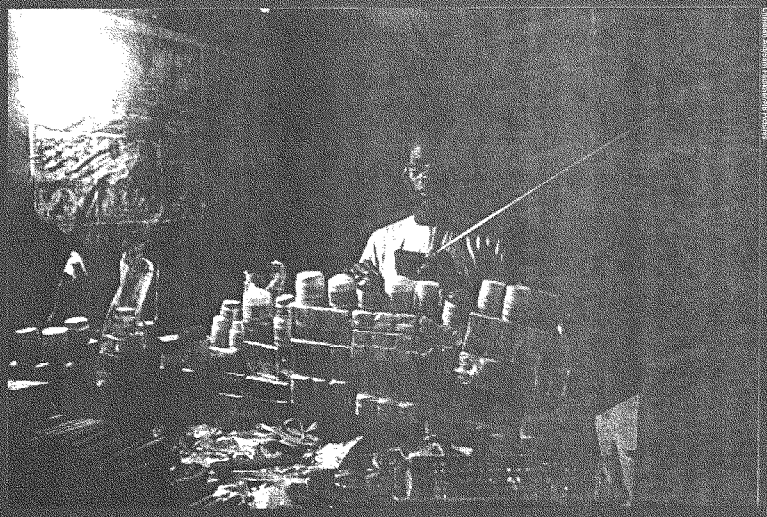
Pancha Bala, 45, stands on the place where her home used to be until it was washed away by the sea during the monsoon season in 2005. Sand now covers the spot where the house stood on Kutubdia, an island off the southern coast of Bangladesh that has shrunk by almost half in the past 50 years due to coastal erosion

'I think in the first instance the moral responsibility [to tackle climate change] lies with absolutely everybody, not only in terms of examining our own lifestyle and asking what, concretely can be done, but also in sending a message to governments that this is recognised as a priority by the public.'

Dr Rowan Williams, Archbishop of Canterbury, 28 March 2006

Recommendations

Mohamed Musa serves customers in his shop in Ahoto, Nigeria, late at night. Before he had a solar light in his shop he was obliged to close when night fell. 'Now I stay open past midnight,' he says. 'Business is very good, much better than with no electricity'



Christian Aid/Tom Pilston/IPG Photo

Tackling poverty and dealing with climate change are now inextricably bound together. Neither poor people nor the climate can wait long for change. Nothing short of a revolution in the way development takes place will suit the needs of either.

In May 2000, Christian Aid warned of the impending disaster of climate change and its impact on poor people.[1] At the time, we found ourselves dealing with increasingly frequent and ferocious climate-related disasters. Since then, along with our partner organisations in poor countries and the people with whom they work, we have also begun to experience the chronic impact of changing weather patterns – unpredictable and volatile rains and ever longer intervening dry periods.[2]

Most poor people depend on their natural environment for their survival and livelihood. Because many also live fragile and marginal existences, any change in the nature of their environment will affect them profoundly. Climate change, as this report definitively establishes, affects poor people first and worst.

Now urgent action is required to halt the rate of climate change and, ultimately, reverse it. This action must come primarily from the industrialised world, from the governments of rich countries and from international organisations. But it must also come from the governments of poor countries.

We do not pretend to have all the answers – this is a vast and complex subject.

What we do know is that unless the first steps outlined in this report are undertaken now, then vast sections of the world's poor people will be condemned to a future even more terrible than they face today. And while it may be poor people who suffer first, the rest of us will assuredly follow.

This is a global problem that requires a global solution. None of us can shelter in bunkers of ignorance or self-interest any more.

It would be easy to give up in the face of such an overwhelming problem, and some forecasts say that it is already too late to reverse the situation. Christian Aid emphatically rejects this position. Ours is not a counsel of despair.

The problems are vast, it is true. But if we accept our responsibility to act now, there is a massive opportunity, not only to halt climate change, but to explore new methods of development that bypass discredited, fossil-fuelled models of growth.

Naturally, poor people need more secure ways of making a living, which implies that new jobs must be created in the countries in which they live. While this may mean more carbon emissions in the short term, it can no longer be argued that growth can only be achieved at the expense of the climate. For growth to favour poor people it must, among other things, use clean technologies wherever possible – growth and development must be sustainable.

With renewable energies there is real hope that this can be achieved. It is clear there are rapid innovations taking place in these clean technologies – in wind, solar and water power – reminiscent of the early days of information technology or mobile phones. And like the Information Age, the Renewable Age could also herald real new opportunities.

If the relentless quest for polluting growth can be stemmed; if carbon emissions can be cut; if new approaches to development can be found for billions of the world's poor people – then the climate change crisis might actually be the genesis of something truly positive instead of being part of a terminal global decline.

The question is whether this revolution is happening fast enough and whether the powers that be are listening. It is up to all of us to ensure that they do.

Cutting carbon emissions

The first and best way to alleviate the effects of climate change on poor people is for the rich world to make immediate and dramatic cuts to damaging greenhouse gas emissions. Where climate change is concerned, our charitable feelings towards the world's poorest people must truly begin with action at home.

So far, the UK and Ireland's contribution has been less than adequate.

Rhetorically, the UK government is taking a leading role. Its focus on both climate change and Africa during its presidency of the G8 last year was most welcome. Its advocacy at the UN climate summit in Montreal in December 2005 in favour of the Kyoto protocol and measures for cutting carbon emissions beyond 2012 are also to be commended.

In reality, however, the government has recently backed away from its previous target of reducing UK emissions by 20 per cent by 2010.[3] Ministers now 'aspire' to hitting the target, saying that 15-18 per cent cuts are more likely. This is extremely disappointing.

Beyond the emissions that the UK pumps directly into the atmosphere – two per cent of the global share – the top 100 stocks and shares traded on the London Stock Exchange are in companies that, between them, are responsible for more than 12 per cent of the world's total emissions.[4] UK plc is a major polluter.

Ireland, meanwhile, has one of the most fossil-fuel intensive economies in the world, with little energy coming from renewable sources.[5] The country is expected to overshoot its Kyoto target by more than 7 million tonnes a year from 2008 – a further 1.75 tonnes per person per year.[6]

The UK and Ireland must now:

- Set an annual 'carbon budget' to limit the amount of greenhouse gas they can produce each year. This budget should then contract by three per cent year-on-year in order to reduce emissions by more than 60 per cent by 2050.
- Offer incentives and penalties in sectors where the most emissions can be cut. The transport and energy industries are the two most significant and demand the governments' most urgent attention. Steps should also be taken by both countries to curb the rapidly rising emissions resulting from the growth in aviation.
- Report annually on whether or not emissions are kept within the limits of the carbon budget, and to set the budget for the following year.
- Establish independent-audit commissions to check that emissions are being reduced in line with the carbon budget and recommend how to ensure they stay within this limit.
- Provide significant tax incentives to drive UK and Irish innovation in renewable energy and other clean technology and use public subsidy to support research and development.

Championing sustainable development

The UK and Irish governments must champion a development revolution – in particular through their development white papers – setting sustainability at its heart.

- The UK government must produce a much clearer working definition of sustainable development that has at its core the stewardship of natural resources, including the atmosphere, for future generations.
- The proposed Irish Aid Environment Policy for Sustainable Development and accompanying three-year action plan, expected in autumn 2006, must also produce a clearer working definition of sustainable development.
- The notion of sustainable development should replace macroeconomic growth as the mantra of development. Growth in itself is neither an efficient tool for poverty eradication nor a policy that can be successfully pursued at the expense of the environment.
- As the aid budgets of the UK and Ireland increase over the next few years, a greater emphasis must be placed on environmental issues and the way in which they relate to poverty. A more finely tuned understanding of sustainable development should be put into practice through a climate-proofing of programmes. This would involve:
  - a thorough review of donor support (through the World Bank and other IFIs) for coal, oil and gas extraction, with a view to phasing it out
  - major new research examining the power needs of poor communities
  - giving additional funds as effective compensation to help vulnerable poor people withstand the inevitable increase in climate-related disasters
  - contribute significantly to international funds to help poor countries take these necessary steps.

International

Climate experts suggest that greenhouse gas emissions must peak by 2015 and then decline rapidly thereafter if the worst of climate change is to be avoided. The significance of this date will not be lost on anyone taking part in the development debate; it is the year by which world leaders have pledged that poverty must be halved and many infectious diseases eradicated.

Action to tackle climate change must be international and equitable. That people in sub-Saharan Africa emit less than one tonne of carbon per year and people in the US more than 24 tonnes is a factual illustration of the current inequity. This must change.

Christian Aid believes, above all else, that poor people have a right to develop and live long, dignified, productive lives. They have a right, in the pursuit of development, to emit carbon just as those countries that are now wealthy have and continue to do. First and foremost, it is rich countries' obligation to create the atmospheric 'space' for this to happen by making real cuts in their emissions.

It is also rich countries' responsibility – having already increased the atmospheric concentration of greenhouse gases to dangerous levels – to help poor countries escape poverty through clean technology. This is not a pipe dream. Renewable energy technology and energy-saving measures (for households, communities, cities and countries) are already available. The overwhelming challenge – witnessed by Christian Aid in Nigeria's solar villages – is the high upfront cost of renewable energy.

While it may be poor people who suffer first, the rest of us will assuredly follow.

- As a starting point, all OECD governments must sign and ratify the Kyoto protocol. Kyoto is not perfect, but it is the only forum for international negotiations on climate change.
- Each OECD government should then adopt its own carbon budget, similar to that Christian Aid recommends for the UK and Ireland. In future, carbon budgets should be apportioned globally, and then be divided by country, industry and even individually.
- As a matter of urgency, the UN's development programme must add a discreet carbon-emissions goal to its 2015 millennium development goals that translates the science of climate change into measurable emissions targets.
- Public funding must be phased out for projects with high production or consumption carbon emissions (oil, gas and coal extraction and fossil fuel-based power generation in particular). This includes funding from the World Bank, other multilateral development banks, export credit agencies and development agencies.
- A global aviation tax, following the model suggested by the French government, should be levied on airline ticket prices as a means of both raising revenue for development and curbing the runaway growth in air travel. In future, this tax should be transferred to aviation fuel itself.
- Rich countries must fund community-led adaptation programmes in poor countries to help those areas of the world already affected to adapt to climate change. In effect, this is compensation for the damage done and must be funded from additional sources, not out of current aid budgets or from any existing promises to increase aid to 0.7 per cent of national wealth.
- While people in poor countries should not be held responsible for climate change, their governments have an obligation to prevent a rapid growth in emissions as their economies grow. After 2012, when the first period of the Kyoto protocol ends, a new agreement that includes binding commitments must be made by rich countries and by those with large and rapidly growing economies – such as China, India, Brazil and South Africa – to control and reduce their emissions. It should also give other, poorer countries the option to sign.

Climate change: A call to action

Individuals Climate change unites us all – each and every one of us will suffer if we allow runaway increases in our emissions to further damage an already ailing atmosphere.

More than one-third of the UK's carbon emissions and a little less than one-third of Ireland's come from people's homes or road transport.[7] This is an issue of personal choice as well as government policy. Christian Aid believes the government must set the framework for change and we will campaign for this, both unilaterally and in coalition with others. But to save 182 million lives in poor countries, individuals must reduce their energy use, lower their carbon emissions and consider contributing financially to offset schemes to support development overseas.

Christian Aid plans to work with its UK and Irish supporters and sponsoring churches to communicate a message of change in the climate's favour – change in government policies, change in organisations, change in individuals' lifestyles.

Christian Aid The central tenet of this report is that carbon emissions hurt poor people. It therefore follows that Christian Aid's emissions hurt poor people and that they must be reduced wherever possible.

Christian Aid is and shall remain a development organisation. The vast majority of our income must be spent helping poor people escape poverty through sustainable development programmes. We must balance our efforts to reduce our emissions against this core purpose.

That said, there are simple steps that we can and will aim to take to bring about a reduction in our carbon emissions. These include:

- seeking to buy energy from a supplier that both sources from and funds the building of renewable energy installations
- reducing staff travel, especially involving flying
- taking all feasible energy-efficiency measures, which will both help reduce emissions and may also save Christian Aid money.

Our aim is to reduce our emissions by at least three per cent per year. We aim to achieve this by saving energy, switching sources and purchasing voluntary 'Gold Standard' offsets to account for those carbon emissions we cannot eliminate.

We will also work with our field offices and partner organisations in poor countries with the eventual aim of monitoring the environmental sustainability of projects across all our programmes.

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We know that in 2004 sub-Saharan Africa spent 3.3 per cent of its GDP on oil. We also know that the average growth rate in sub-Saharan Africa over the past five years has been 3.4 per cent a year. We know, too, that the price of a barrel of oil bought in sub-Saharan Africa during 2004 was US$37.70. NEF has also forecast how much oil will cost in sub-Saharan Africa each year up to and including 2015 using two different price structures, a mid cost and a high cost. The mid-price scenario is based on NYMEX oil futures prices (as of 22 March 2006) until 2012. Thereafter, prices are assumed to remain constant in real terms. This represents an average reduction in the real price of 1.8 per cent per annum between 2005 and 2025. The high-price scenario predicts that the oil price reaches US$100 per barrel in nominal terms in 2012, and continues to rise at a similar (arithmetic) rate thereafter. This represents an average increase in the real price of 4.4 per cent per annum between 2005 and 2025.)
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Annotated Oral Testimony of
Dr. E. Calvin Beisner
to the Environment and Public Works Committee
of the
United States Senate
Wednesday, October 20, 2006

Mr. Chairman, members of the Committee, and distinguished guests, thank you for inviting me to speak to you today. Having never before this year been significantly involved in politics other than to vote in elections, it is strange to find myself here. But my moral convictions as a Christian persuade me that I must speak out on an issue on which literally millions of lives hang in the balance.

As a professor of Christian ethics, I distinguish principles and motives from applications. God through His Word has given us absolute moral principles: You shall have no other gods before Me; you shall not worship idols; you shall not take the name of the Lord in vain; remember the Sabbath day to keep it holy; honor your father and mother; you shall not murder, commit adultery, steal, bear false witness, or covet. As for motives, He says, "Do justice, love mercy, and walk humbly with your God" (Micah 6:8). These Ten Commandments and these three motives apply to all people, everywhere, in all circumstances.

But it isn't always obvious *how* principles apply, and even with the best motives we may unintentionally do great harm. It is easy to look at an apparent threat and think, "We can solve that this way." But sometimes we misunderstand the nature, causes, or extent of the threat, or fail to compare one threat with others that might be more significant, and so we prescribe solutions that won't work, that unintentionally cause more harm than they prevent, or that divert investment from more helpful measures. What would have happened, for example, had Congress legally mandated the use of DES, a drug widely thought in the 1950s to reduce the risk of miscarriage later but found to be ineffective for that but to raise the risk of cervical and uterine cancer for women exposed to it in utero? Great harm, instead of the good intended–and reversing its use would have taken far longer than it did without the legal mandate.

For eighteen years I have been studying the ethics, economics, and science of environmental stewardship, especially global warming. I have read major books on global warming by leading scientists on all sides of the controversy, studied the IPCC Assessment Reports, and read hundreds of scholarly and popular articles. My study convinces me that there is a major disjunct between the best science and economics in the field, on the one hand, and popular media and public opinion, on the other. Time forbids detail here, but I have submitted fuller written testimony and request, Mr. Chairman, that it be included in the record.

Popular opinion is that human emissions of carbon dioxide are the majority cause of current warming, which is greater than any in history and will become catastrophic by the middle of this century, and that we can and must prevent that catastrophe by reducing CO_2 emissions.[1] In contrast,

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[1]The popular belief that there is such a consensus is dubious at best. Since 1998 over 19,700 scientists have signed a petition saying, "There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gasses is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon the natural plant and animal environments of the Earth." The signers include "2,660 physicists, geophysicists, climatologists, meteorologists, oceanographers, and environmental scientists who are especially well qualified to evaluate the effects of carbon dioxide on the Earth's atmosphere and climate" and "5,017 scientists whose fields of specialization in chemistry, biochemistry, biology, and other life sciences make them especially well qualified to evaluate the effects of carbon dioxide on the Earth's plant and animal life." (See the Oregon Petition Project at http://www.oism.org/pproject/s33p37.htm. Dr. Art Robinson, who managed the project and keeps the signature list up to date, reports that additional scientists continue to sign the petition regularly, and almost none have removed their signatures in the nine years the petition has been in existence. For a complete list of signers, separate lists of those with specialized qualifications, and refutation of attempts to discredit the Petition, see http://www.oism.org/pproject/s33p357.htm.) Similarly, since 1995 over 1,500 topic-qualified scientists have signed the Leipzig Declaration opposing the Kyoto Protocol (http://www.sepp.org/leipzig.html). Forty-seven topic-qualified scientists who reject the hypothesis of catastrophic human-induced global warming are listed at http://www.envirotruth.org/myth_experts.cfm, complete with contact information and notes on their subjects of expertise.)

In 2004 *Science* published the results of a study by Naomi Oreskes claiming that "without substantial disagreement, scientists find human activities are heating the earth's surface." (Naomi Oreskes, "The scientific consensus on climate change," *Science*, vol. 306, issue 5702 (December 3, 2004), 1686, at http://www.sciencemag.org/cgi/content/full/306/5702/1686.) But an attempt at replicating the study both found that she had made serious mistakes in handling data and, after re-examining the data, reached contrary conclusions. Oreskes claimed that an analysis of 928 abstracts in the ISI database containing the phrase "climate change" proved the alleged consensus. It turned out that she had searched the database using three keywords ("global climate change") instead of the two ("climate change") she reported–reducing the search results by an order of magnitude. Searching just on "climate change" instead found almost 12,000 articles in the same database in the relevant decade. Excluded from Oreskes's list were "countless research papers that show that global temperatures were similar or even higher during the Holocene Climate Optimum and the Medieval Warm Period when atmospheric CO_2 levels were much lower than today; that solar variability is a key driver of recent climate change; and that climate modeling is highly uncertain." Further, even using the three key words she actually used, "global climate change," brought up 1,247 documents, of which 1,117 included abstracts. An analysis of those abstracts showed that

- only 1 percent explicitly endorsed what Oreskes called the "consensus view";
- 29 percent implicitly accepted it "but mainly focus[ed] on impact assessments of envisaged global climate change";
- 8 percent focused on "mitigation";
- 6 percent focused on methodological questions;
- 8 percent dealt "exclusively with paleo-climatological research unrelated to recent climate change";
- 3 percent "reject[ed] or doubt[ed] the view that human activities are the main drivers of the 'the [sic] observed warming over the last 50 years'";
- 4 percent focused "on natural factors of global climate change"; and
- 42 percent did "not include any direct or indirect link or reference to human activities, CO_2 or greenhouse gas emissions, let alone anthropogenic forcing of recent climate change."

(Benny J. Peiser, Letter to *Science*, January 4, 2005, submission ID: 56001. *Science* Associate Letters Editor Etta Kavanagh eventually decided against publishing the letter, or the shortened version of it provided at her request by Peiser, not because it was flawed but because "the basic points of your letter have already been widely dispersed over the internet" [e-mail from Etta Kavanagh to Benny Peiser, April 13, 2005]. Peiser, a scientist at Liverpool John Moores

as climatologist Roy Spencer, environmental economist Ross McKitrick, energy policy analyst Paul Driessen, and I argued in "A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming" (www.interfaithstewardship.org), submitted herewith, the best science and economics indicate that

- current warming is within the range of natural variability;[2]

University, replied: "As far as I am aware, neither the details nor the results of my analysis have been cited anywhere. In any case, don't you feel that SCIENCE has an obligation to your readers to correct manifest errors? After all, these errors continue to be employed by activists, journalists and science organizations . . . . Are you not aware that most observers know only too well that there is absolutely *no* consensus within the scientific community about global warming science?" He went on to cite a survey of "some 500 climatologists [that] found that 'a quarter of respondents still question whether human activity is responsible for the most recent climatic changes," and other evidence. Peiser, e-mail to Kavanagh, April 14, 2005. The whole correspondence, including much more evidence of the lack of scientific consensus on anthropogenic global warming, is online at www.staff.livjm.ac.uk/spsbpeis/Scienceletter.htm.)

On April 6, 2006, sixty well-qualified scientists working in the field of climate change sent an open letter to Canadian Prime Minister Stephen Harper, saying, "Observational evidence does not support today's computer climate models, so there is little reason to trust model predictions of the future." The scientists went on to reject the vision of catastrophic human-induced global warming and oppose the Kyoto Protocol (http://www.canada.com/components/print.aspx?id=3711460e-bd5a-475d-a6be-4db87559d605). Shortly afterward a group of leading New Zealand climatologists and meteorologists skeptical of catastrophic human-induced global warming formed The New Zealand Climate Science Coalition (http://www.climatescience.org.nz/Index.php. For a news report on it, see http://www.nzherald.co.nz/section/story.cfm?c_id=1&ObjectID=10379768). And on April 20, 2006, the British Broadcasting Corporation aired a radio program, "Overselling Climate Change," in which many scientists, including those who believe global warming is a serious problem, decried exaggerated claims about it that undermine confidence in science ("Overselling Climate Change," audio online at http://www.bbc.co.uk/radio4/thebattleforinfluence/pip/abkim/). As MIT climatologist Richard Lindzen testified before this committee,

> Indeed, the whole issue of consensus and skeptics is a bit of a red herring. If, as the news media regularly report, global warming is the increase in temperature caused by man's emissions of CO_2 that will give rise to rising sea levels, floods, droughts, weather extremes of all sorts, plagues, species elimination, and so on, then it is safe to say that global warming consists in so many aspects, that widespread agreement on all of them would be suspect *ab initio*. If it truly existed, it would be evidence of a thoroughly debased field. In truth, neither the full text of the IPCC documents nor even the summaries claim any such agreement. Those who insist that the science is settled should be required to state exactly what science they feel is settled.

The idea of scientific consensus on catastrophic human-induced global warming is an illusion. Further, science is not a matter of consensus but of data and valid arguments. As Thomas Kuhn so famously pointed out in *The Structure of Scientific Revolutions*, great advances in science, often involving major paradigm shifts, occur when small minorities patiently–and often in the face of withering opposition–point out anomalies in the data and inadequacies in the reigning explanatory paradigms until their number and weight become so large as to require a wholesale paradigm shift, and what once was a minority view becomes a new majority view. Indeed, skepticism is essential to science: "Most institutions demand unqualified faith; but the institution of science makes skepticism a virtue" (Robert K. Merton, "Science and the Social Order," *Philosophy of Science* 5:3 (July 1938), 321-337, at 334).

[2]The principal basis of claims that current warming exceeds natural variation has been the work of paleoclimatologist Michael Mann and associates, best known through what has been called the "hockey stick" graph and cited by the Intergovernmental Panel on Climate Change's *Third Assessment Report*. The target of serious criticism of its data gathering and statistical methodologies, that work was finally discredited by the "Ad Hoc Committee Report on the 'Hockey Stick' Global Climate Reconstruction" presented to the House Energy and Commerce Committee on July 14, 2006, and available online at http://energycommerce.house.gov/108/home/07142006_Wegman_Report.pdf.

- human emissions of CO_2 are a minor cause of global warming,[3] but they enhance plant growth

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The "Wegman Report." The Executive Summary reads in part:

> In general, we found MBH98 and MBH99 to be somewhat obscure and incomplete and the criticisms of MM03/05a/05b to be valid and compelling. We also comment that they were attempting to draw attention to the discrepancies in MBH98 and MBH99, and not to do paleoclimatic temperature reconstruction. Normally, one would try to select a calibration dataset that is representative of the entire dataset. The 1902-1995 data is not fully appropriate for calibration and leads to a misuse in principal component analysis. However, the reasons for setting 1902-1995 as the calibration point presented in the narrative of MBH98 sounds reasonable, and the error may be easily overlooked by someone not trained in statistical methodology. We note that there is no evidence that Dr. Mann or any of the other authors in paleoclimatology studies have had significant interactions with mainstream statisticians.
>
> In our further exploration of the social network of authorships in temperature reconstruction, we found that at least 43 authors have direct ties to Dr. Mann by virtue of coauthored papers with him. Our findings from this analysis suggest that authors in the area of paleoclimate studies are closely connected and thus 'independent studies' may not be as independent as they might appear on the surface. This committee does not believe that web logs are an appropriate forum for the scientific debate on this issue.
>
> It is important to note the isolation of the paleoclimate community; even though they rely heavily on statistical methods they do not seem to be interacting with the statistical community. Additionally, we judge that the sharing of research materials, data and results was haphazardly and grudgingly done. In this case we judge that there was too much reliance on peer review, which was not necessarily independent. Moreover, the work has been sufficiently politicized that this community can hardly reassess their public positions without losing credibility. Overall, our committee believes that Mann's assessments that the decade of the 1990s was the hottest decade of the millennium and that 1998 was the hottest year of the millennium cannot be supported by his analysis.

[3]Media often report the claim in the Executive Summary of the IPCC's *Third Assessment Report* that attributes "most of the warming" to human influences, but the working conclusion of the scientific panel was much more reserved, saying, ""From the body of evidence since IPCC (1996), we conclude that there has been *a discernible* human influence on global climate. Studies are beginning to separate the contributions to observed climate change attributable to individual external influences, both anthropogenic and natural. This work suggests that anthropogenic greenhouse gases are *a substantial* contributor to the observed warming, especially over the past 30 years. However, the accuracy of these estimates continues to be limited by *uncertainties* in estimates of internal variability, natural and anthropogenic forcing, and the climate response to external forcing." (Government and Expert Review Draft, IPCC Working Group 1 Third Assessment Report, 5, emphases added.) A number of studies support the conclusion that natural causes–e.g. fluctuations in solar output, changes in cloud forcing, and precipitation microphysics–could outweigh human CO_2 emissions as causes of the current global warmth. The IPCC attributes the whole warming of the first half of the twentieth century–about 0.5° C–to solar variability. John T. Houghton, *et al.*, *Climate Change 2001: The Scientific Basis. Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2001), 697. See also Climate Research Committee, Board on Atmospheric Sciences and Climate, Commission on Geosciences, Environment, and Resources of the National Research Council, "Natural Climate Variability On Decade-to-Century Time Scales" (Washington, D.C.: National Academy Press, 1995), online at: http://darwin.nap.edu/books/0309054494/html; N. O. Renno, K. A. Emanuel, and P. H. Stone, "Radiative-convective model with an explicit hydrologic cycle 1. Formulation and sensitivity to model parameters," *Journal of Geophysical Research* 99 (July 10, 1994), 14,429-14,441. Such natural causes–especially fluctuations in solar energy output, changes in earth's orbit and tilt (The Marian Koshland Science Museum of the National Academy of Sciences explains and illustrates these well in "Global Warming Facts & Our Future" at http://www.koshland-science-museum.org/exhibitgcc/causes08.jsp.), and other long and (geologically) short cycles–certainly outweigh human CO_2 emissions as causes of climate change in history. See, e.g., S. Fred Singer and Dennis T. Avery, "The Physical Evidence of Earth's Unstoppable 1,500-Year Climate Cycle" (Dallas: National Center for Policy Analysis, NCPA Policy Report No. 279, 2005), and Singer and Avery, *Unstoppable Global Warming–Every 1,500 Years* (Lanham: Rowman & Littlefield, 2006 [forthcoming]).

and so contribute to feeding the human population and all other species;[4]

- global warming is unlikely to become catastrophic in the foreseeable future;[5]
- no achievable reductions in CO_2 emissions would reduce future temperature detectably, let alone enough to avert catastrophe;[6] and

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[4]For every doubling of atmospheric CO_2 concentration, there is an average 35 percent increase in plant growth efficiency. Plants grow better in warmer and colder temperatures and in drier and wetter conditions, and they are more resistant to diseases and pests. Consequently their ranges and yields increase. Many studies have been published demonstrating the benefits of rising CO_2 to agriculture. Much of the work has been done by scientists at the Center for the Study of Carbon Dioxide and Global Change, http://www.co2science.org/scripts/CO2ScienceB2C/Index.jsp, which has links to many articles by both its own scientists and others.

[5]Catastrophic climate scenarios critically depend on the extremely unlikely assumption that global average temperature would rise 6° C (10.8° F) or more in response to doubled CO_2. But more credible estimates of climate sensitivity to doubled CO_2 have been in the range of 1.5° to 4.5° C (2.7° to 8.1° F). Researchers using several independent lines of evidence asserted a "maximum likelihood estimate . . . close to 3° C" (5.4° F). They concluded, "our implied claim that climate sensitivity actually has as much as a 5% chance of exceeding 4.5° C is not a position that we would care to defend with any vigour, since even if it is hard to formally rule it out, we are unaware of any significant evidence in favour of such a high value." (J. D. Annan and J. C. Hargreaves, "Using multiple observationally-based constraints to estimate climate sensitivity," *Geophysical Research Letters*, vol. 33, L06704, doi:10.1029/2005GL025259, 2006, online at http://www.agu.org/pubs/crossref/2006/2005GL025259.shtml; prepublication draft at http://www.jamstec.go.jp/frcgc/research/d5/jdannan/GRL_sensitivity.pdf. See also G. Hegerl, et al., "Climate sensitivity constrained by temperature reconstructions over the past seven centuries," *Nature* 440 (April 20, 2006): 1029-1032.) It is very unlikely that warming in that range would cause catastrophic consequences. Why? Among other reasons, because CO_2-induced warming will occur mostly in winter, mostly in polar regions, and mostly at night. But in polar regions, where winter night temperatures range far below freezing, an increase of 5.4° F is hardly likely to cause significant melting of polar ice caps or other problems.

Even if the recent strong warming trend (at most 1° F in the last thirty years) is entirely manmade (and it almost certainly is not), and even if it continues for another thirty years (as it might), global average temperature will only be at most 1° F warmer then than now. Predicting climate beyond then depends on assumptions about future use of fossil fuels. Such assumptions are dubious in light of continuous changes in energy sources throughout modern human history. Who could have predicted our current mix of energy sources a century-and-a-half ago, when wood, coal, and whale oil were the most important components and petroleum and natural gas were barely in use?

[6]Calculations of the range of temperature reduction from compliance with Kyoto differ but are all very low. E.g.: (1) "the Kyoto Protocol . . ., if adhered to by every signatory (including the United States)[,] would only reduce surface temperature by 0.07° C (.13° F) in fifty years" (Michaels, *Meltdown*, 19). (2) "Global mean reductions [in warming by 2100] for the three scenarios are small, 0.08-0.28°C" [i.e., 0.14-0.5° F] (T. M. L. Wigley, "The Kyoto Protocol: CO2, CH4 and Climate Implications," *Geophysical Research Letters*, vol. 25 [July 1998], 2285-88, at 2287). Wigley writes: "For B=CONST, the expected global-mean warming to 2100 is reduced by [Kyoto compliance by] 0.10-0.21°C depending on the climate sensitivity (close to 7% in all cases). For NOMORE, the reduction in warming is 4%, while for the B= -1% case it is approximately 14%. The rate of slow-down in temperature rise is small, with no sign of any approach to climate stabilization. *The Protocol, therefore, . . . can be considered only as a first and relatively small step towards stabilizing the climate*" (Wigley, "The Kyoto Protocol," 2287-88, emphasis added). National Center for Atmospheric Research scientist Jerry Mahlman says elimination of human-induced warming would require "forty successful Kyotos" (Tim Appenzeller and Dennis Dimick, "The Heat Is On," *National Geographic*, September 2004, 11). David Malakoff cites other climate scientists as saying thirty (David Malakoff, "Thirty Kyotos Needed to Control Warming," *Science*, December 19, 1997, 2048). As MIT climatologist and IPCC reviewer Richard Lindzen put it in testimony before this committee, "Should a catastrophic scenario prove correct, Kyoto will not prevent it. If we view

- such efforts would fruitlessly divert scarce resources from other endeavors that would be of far greater benefit to humanity.

Rather than focus narrowly on a single problem, we must choose carefully where to invest our limited resources. The hundreds of billions of dollars per year it would cost the global economy to significantly reduce CO_2 emissions would be of little or no benefit to humanity.[7] When the scholars of the Copenhagen Consensus ranked seventeen challenges facing humanity, the three *best* investments were fighting communicable diseases, fighting malnutrition and hunger by providing micronutrients, and liberalizing trade, while the three *worst* investments all had to do with reducing CO_2 emissions to mitigate global warming. Money would be far better spent on AIDS and malaria prevention, water sanitation, and nutrition.[8]

A clean, healthful environment being a costly good, wealthier communities better afford it than poorer ones, and affordable energy is crucial to creating wealth. Electrifying the billion or more

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Kyoto as an insurance policy, it is a policy where the premium appears to exceed the potential damages, and where the coverage extends to only a small fraction of the potential damages. Does anyone really want this? I suspect not." ("Testimony of Richard S. Lindzen before the Senate Environment and Public Works Committee on 2 May 2001," online at http://epw.senate.gov/107th/lin_0502.htm.)

[7]Compliance with the Protocol, without a global carbon emissions trading mechanism, could cost the global economy about $1 trillion per year, yet full compliance would reduce global warming by less than 0.2° F by 2050. (Bjørn Lomborg, "Should we implement the Kyoto Protocol? No–We risk burdening the global community with a cost much higher than that of global warming," at www.spiked-online.com/articles/00000002D2C3.htm.) More specifically, with no emissions trading, the combined annual cost of compliance in the year 2010 to the United States, the European Union, Japan, Canada, Australia, and New Zealand alone would be around $350 billion; with emissions trading within two blocks of that group, about $240 billion; with unrestricted trading within all Annex I countries, slightly over $150 billion; and with global trading, about $75 billion. Lomborg, *Skeptical Environmentalist*, 303, Figure 158, citing John P. Weyant and Jennifer N. Hill, "Introduction and overview," *The Energy Journal*, Kyoto Special Issue [1999], vii-xliv, at xxxiii-xxxiv, and Bureau of Economic Analysis, *Price Indexes for Gross Domestic Product and Gross Domestic Purchases* (www.bea.doc.gov/bea/dn/st3.csv) and *Selected NIPA Tables showing advance estimates for the fourth quarter of 2000* (www.bea.doc.gov/bea/dn/dpga.txt), both 2001.

[8]Bjørn Lomborg, *Global Crises, Global Solutions* (Cambridge: Cambridge University Press, 2004); http://www.copenhagenconsensus.com/Default.aspx?ID=675. In the process, studies by specialists and respondents were submitted to eight expert economists, including three Nobel Laureates, who then prioritized major problems facing mankind and alternative solutions to them and then ranked them from most to least effective. The alternatives were divided into four categories of cost-effectiveness–Very Good, Good, Fair, and Bad–and listed in descending order of cost effectiveness (how many people would experience how much benefit at what cost) within each category. The results (*Global Crises, Global Solutions*, 606) were: **Very Good**: 1. Communicable diseases: control of HIV/AIDS. 2. Malnutrition and hunger: providing micronutrients. 3. Subsidies and trade: trade liberalization. 4. Communicable diseases: control of malaria. **Good**: 5. Malnutrition and hunger: development of new agricultural technologies. 6. Sanitation and water: community-managed water supply and sanitation. 7. Sanitation and water: small-scale water technology for livelihoods. 8. Sanitation and water: research on water productivity in food production. 9. Governance and corruption: lowering the cost of starting a new business. **Fair**: 10. Migration: lowering barriers to migration for skilled workers. 11. Malnutrition and hunger: improving infant and child nutrition. 12. Communicable diseases: scaled-up basic health services. 13. Malnutrition and hunger: reducing the prevalence of low birth weight. **Bad**: 14. Migration: guest worker programs for the unskilled. 15. Climate change: optimal carbon tax. 16. Climate change: Kyoto Protocol. 17. Climate change: value-at-risk carbon tax. **Of the seventeen options, the three worst all had to do with attempting to reduce global warming.**

homes that use wood and dung as their chief fuels for heating and cooking would eliminate most of the 1.6 million premature deaths per year that the World Health Organization attributes to indoor smoke.[9] Sharing technology with rapidly growing economies like India and China would speed both their adoption of cleaner fuels and their economic development. The strong correlation between economic development and improved health and life expectancy underscores the morality of such a policy. It would be morally unconscionable to force the world's developing countries to delay their climb out of poverty by denying them, as would any serious cuts in CO_2 emissions, the cheap, abundant energy available from carbon fuels.

The Bible tells us to "remember the poor" (Galatians 2:10). We need not, in order to identify the morally preferable global climate policy, resolve the enormously complex controversy over the causes and extent of global warming or the possibility of mitigating it. There is one thing we already know quite well: a richer society endures any catastrophe better than a poorer one. If we want to help the world's poor, we shall do so far better by helping them become wealthy and able to adapt to whatever temperature the future holds than by slowing their economic development, condemning them to additional generations of poverty and its attendant suffering, and depriving them of the wealth they need to triumph over any future catastrophe.[10] I urge you, therefore, to support policies that will promote economic development–for the sake of both the world's poor, and the world's environment.

E. Calvin Beisner, Ph.D., is associate professor of social ethics at Knox Theological Seminary, national spokesman for the Interfaith Stewardship Alliance, and a co-founder of the Interfaith Council on Environmental Stewardship and co-author of "The Cornwall Declaration on Environmental Stewardship." He has written three books on environmental stewardship: *Prospects for Growth: A Biblical View of Population, Resources, and the Future* (1990); *Man, Economy, and Environment in Biblical Perspective* (1994), and *Where Garden Meets Wilderness: Evangelical Entry Into the Environmental Debate* (1997). He was managing editor of *The State of Humanity* (1995). He is co-author of "A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming" (2006); of "An Examination of the Scientific, Ethical, and Theological Implications of Climate Change Policy" (2005); and of "A Biblical Perspective on Environmental Stewardship," in *Environmental Stewardship in the Judeo-Christian Tradition: Jewish, Catholic, and Protestant Wisdom on the Environment*, edited by Michael B. Barkey (2000).

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[9]The Intermediate Technology Development Group, citing United Nations and International Energy Agency data. Smoke from wood and dung fires thus kills more people than malaria and almost as many as unsafe drinking water and lack of sanitation. Most of its victims are women and children. Alex Kirby, "Indoor smoke 'kills millions'," BBC News, November 28, 2003, online at http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/3244214.stm.

[10]The world's poor are much better served by enhancing their wealth through economic development than by whatever minute reductions might be achieved in future global warming by reducing CO_2 emissions. See, as examples of studies supporting such conclusions, the following papers by environmental policy analyst Indur M. Goklany: "Comments to the Stern Review on the Economics of Climate Change," March 17, 2006, at http://members.cox.net/goklany/Stern%202.pdf; "Evidence for the Stern Review on the Economics of Climate Change," December 9, 2005, http://members.cox.net/goklany/Goklany-%20Evidence%20for%20Stern%20Review.pdf; "Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development," http://members.cox.net/igoklany/Goklany-Integrating_A&M_preprint.pdf; "A Climate Policy for the Short and Medium Term: Stabilization or Adaptation?", *Energy & Environment* 16:3&4 (2005), http://members.cox.net/igoklany/EEv16_Stab_or_Adaptation.pdf; "Evidence to the House of Lords Select Committee on Economic Affairs on Aspects of the Economics of Climate Change," *Energy & Environment* 16:3&4 (2005), http://members.cox.net/igoklany/EEv16-3+4_GoklanyHoL_Evidence.pdf.

RESPONSES BY E. CALVIN BEISNER TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. You said in your testimony that "sharing technology with rapidly growing economies like India and China would speed their adoption of cleaner fuels and economic development." Why do you believe that a technology-based approach is better than a Kyoto-style cap and trade method?

Response. First and most fundamentally, the cap-and-trade method is useless because its aim is to reduce future global average temperature by reducing CO_2 emissions. There are three problems with that. (a) It is meaningless because "global average temperature" is a meaningless statistic; it is not really a temperature but a statistic achieved by averaging unrepresentative samples according to an arbitrarily chosen averaging method, as explained brilliantly in Christopher Essex and Ross McKitrick's Taken By Storm: The Troubled Science, Policy and Politics of Global Warming. (b) Even if cap-and-trade or any other method of reducing CO_2 emissions were possible, its impact on future temperatures would be minuscule, detectable only as an equally meaningless statistic that vanishes in the noise of natural variation. (c) The cost of achieving that minuscule and non-experiential reduction not in temperature but in a meaningless statistic would be enormous, ranging from a low around $200 billion to a high around $1 trillion per year to the global economy, for which cost no significant difference in future climate or climate impacts is achieved. Second, a technology-based approach is preferable because it leads to improved energy efficiencies regardless whether we want or are able to achieve any hypothetical reduction in future temperatures.

Question 2. During the hearing, I asked "if carbon caps were imposed, what impact would this have on efforts to bring electricity to Africa's remote regions, and what significance would this have on efforts to combat poverty there?" Could you provide further elaboration on your answer?

Response. One of the most obvious impacts would be a reduction in trade between developing nations (whether in Africa or elsewhere) and advanced economies. Just last month news stories appeared discussing the intention of European legislators to raise tariffs on imports from countries not covered by Kyoto, in order to protect their own more highly paid workers from competition from workers in the developing countries. The notion has also been proposed of taxing agricultural products for the distance they must travel to end purchaser. That would not only raise the cost of food for end purchasers in developed countries but also depress demand for those agricultural products in the developing countries where they are grown—thus diminishing the income of agricultural and other workers in those countries. If we are to care about the poor, we must reject such policies. A second obvious impact is simply that diminished fossil fuel use will not be achieved without raising the price of fossil fuel worldwide—which will delay for decades or generations the economic development of poor countries deprived of the cheap energy presently developed countries used to fuel their own development.

Question 3. Al Gore says that global warming is a moral issue. Will you comment on this statement?

Response. Yes, it is a moral issue. It is an issue of telling the truth instead of falsehood. It is an issue of not scaring people needlessly about statistical fictions that represent no reality. It is an issue of not depriving developing countries of the cheap energy developed nations used to grow prosperous and deliver their people from hunger, malnutrition, disease, pollution, and the millions of premature deaths that result from these. It is an issue of telling the public clearly that the best science says that human contribution to global warming is at most minute while the main causes are natural and utterly unstoppable. It is an issue of telling the public clearly that historically a warmer world has been a healthier and wealthier world and that a colder world has seen more severe weather events than a warmer world. It is an issue of turning to good science instead of movies for the technical information necessary to guide sound policy. It is an issue of not spending hundreds of billions of dollars a year in a quixotic quest to fight the statistical fiction of human-induced global warming when that money could deliver thousands of times as many people from disease and death if it were spent to provide pure drinking water, sewage sanitation, residential and commercial electrification, eradication of disease-bearing pests, improvement of food production and distribution, or reduction of the spread of communicable diseases. Yes, it is a moral issue—but not at all the moral issue Gore thinks it is. It is an issue of Mr. Gore's needing to stop his demagoguery, which threatens to continue wasteful policies that keep millions of people's lives at risk.

A Time for Bold and Immediate Action on Global Warming: An Urgent Appeal from Religious Leaders for Mandatory Limits on Greenhouse Gases

Open letter to Senate Environment and Public Works Committee

September 19, 2006

Hon. James Inhofe
Chair, Environment and Public Works Committee
U.S. Senate
Dirksen Building Room 410
Washington, DC 20510

Hon. James Jeffords
Vice Chair, Environment and Public Works Committee
U. S. Senate
Dirksen Building Room 456
Washington, DC 20510

Dear Sen. Inhofe, Jeffords, and Committee Members:

We are clergy and religious leaders of many faith traditions from across the country who have joined together to ask that you take immediate action to curb global warming. We believe that it is our moral responsibility to protect the earth's climate. We believe we must heed the scientists who are warning us that human-induced climate change is already affecting our planet's life-sustaining systems. The situation is urgent and we can no longer wait to enact mandatory limits on global warming pollution.

We are watching with alarm as the pace of climate change quickens and our leaders in Washington do nothing to alleviate the growing crisis. We appeal to you to take a responsible, leadership position in the world community by making a firm commitment to significantly reduce levels of greenhouse gas emissions.

Concrete measures must be put in place to begin to turn the tide of global warming. The time for studies and voluntary measures has come and gone. Scientists tell us we must reduce emissions by 75% or more by 2050 to avoid the most catastrophic impacts. Setting a mandatory limit on greenhouse gas emissions would place us on the right path and allow us to ultimately reach sustainable levels.

We appeal to you from a position of faith. Every major religious tradition calls us to be stewards of Creation. We have a moral responsibility to protect the earth for our children and future generations. As religious leaders, we recommit ourselves today to do our part by educating our congregants on the importance of this issue, and to use energy as efficiently as possible. But we cannot do it alone. We need government regulation to help protect our health and our ecosystem.

We appeal to you from a position of justice. While we will all be affected by a destabilized climate, it is the poorest among us who will suffer most from heat waves, floods, famine, disease, and drought. As the country with the highest greenhouse gas emissions in the world, and the

largest economy, the United States has a responsibility to join the global effort to prevent catastrophic climate changes.

We appeal to you from a position of hope. If we act immediately, we can turn the tide toward sustainability. With a collective effort, determination, and decisive action, we will ensure a sustainable future for generations to come. We appeal to you and will pray for your good judgment on this matter, knowing that we are responsible for our actions.

Sincerely,

Alaska

Reverend Robert A. Young
Holy Spirit Church
Eagle River, AK

The Reverend Paul K. Klitzke
Wasilla, AK

California

The Rev. Sally Bingham
Executive Director
The Regeneration Project
California Interfaith Power and Light, CA

The Rev. Albert G. Cohen
Executive Director
Southern California Ecumenical Council, CA

John Bass
Board President
Northern California Interreligious Conference, CA

Rev. Peter Laarman
Executive Director
Progressive Christians Uniting
Los Angeles, CA

Abbess Linda Ruth Cutts
San Francisco Zen Center
San Francisco, CA

The Rev. David Thompson
Westminster Presbyterian
Sacramento, CA

Durriya Syed
Sacramento Area League of Associated Muslims
Interfaith Service Bureau, CA

Rabbi Melanie Aron
Congregation Shir Hadash
Los Gatos, CA

Rev. Dexter Macnamara
Executive Director
Interfaith Service Burean
Sacramento, CA

Mark Carlson
Executive Director
Lutheran Office of Public Policy, CA

Peter Bergstrom
Episcopal Camp Stephens
Julian, CA

The Rev. Dr. John C. Forney
Common Ground & Special Projects
Progressive Christians Uniting
Los Angeles, CA

Pastor Suzanne Darweesh
Board of Directors
Progressive Christians Uniting
Los Angeles, CA

Rev. Jerald M. Stinson, Senior Minister
First Congregational Church of Long Beach, CA

Rev. Paul Kittlaus, Assistant Pastor
Claremont United Church of Christ, CA

Rev. Barry F. Cavaghan

Rev. Margo Tenold
Co-Executive Director
Council of Churches, Santa Clara County, CA

Rev. Rick Yramategui
Carmel Valley Community Chapel
Carmel Valley, CA

The Rev. Scot E Sorensen
St. John's Lutheran Church
Sacramento, CA

The Rev. Stina Pope

Holy Child and St Martin's Episcopal Church
Daly City, CA

Rev. Kay Alice Daly
Church of Scientology of Sacramento
Interfaith Service Bureau
Sacramento, CA

Rev. Thomas E. Duggan, Presbyterian Church (USA)

Rev. Joanne Peterson
Walnut Avenue United Methodist Church
Walnut Creek, CA

Rev. William P Miller
Whittier, CA

David Macmurdo, Retired UMC Pastor
St. Mark's United Methodist Church
Sacramento, CA

The Rev. Sue Thompson,Vicar
St Edmund's Episcopal Church
Pacifica, CA

Pastor Warren C. Nielsen
Christ the King Lutheran Church
Fremont, CA

Rev. Nancy Palmer Jones
Senior Minister, First Unitarian Church of San Jose
San Jose, CA

Rev. Dr. Patricia Keel
Unity of Berkeley
Berkeley, CA

Sr. Elaine Sanchez
Social Justice Coordinator
Sisters of the Holy Family, CA

Rev. R. Richard Roe
United Church of Christ, CA

The Rev. Dr. Edward A. Wilson
Chaplain, Los Gatos Meadows
Los Gatos, CA

The Rev. Karin White
Campbell, CA

Rev. Kevin Smith
United Church of Christ
San Jose, CA

Rev. Sally Brown
Board Certified Clinical Chaplain
United Church of Christ, CA

Rev. Dr. Diana Gibson
Co-Executive Director
Council of Churches of Santa Clara County
San Jose, CA

Rev. Genavieve Heywood
Pastor
Congregational Community Church, UCC
Sunnyvale, CA

The Rev. Ronald J. Degges
Little White Chapel Christian Church
Burbank, CA

Rev. Dr. Judith Pruess-Mellow
Exec. Dir. of Senior New Ways
UMC Pastor, CA

Rev. Elane O'Rourke
Campbell United Church of Christ
Campbell, CA

Rev. Jeffrey Spencer
Niles Congregational Church, UCC
Fremont, CA

Rev. Dr. Diane M. Miller
Mt. Diablo Unitarian Universalist Church
Walnut Creek, CA

Rev. Sierra Lynne White, MFT
Integrative Counseling & Interfaith Ministry, CA

Sister Juanita Cordero, RCWP
San Jose, CA

Sister Margaret M. Diener, OP
Oakland, CA

Rev. Robyn M. Hartwig
Lutheran Church of Our Redeemer
Sacramento, CA

Sister Rosemarie
Mountain Center Hermitage
Mountain Center, CA

Rev. Sally Juarez
High Street Presbyterian Church
Oakland, CA

The Rev. George Ross

Rev. Felicity Wright
Arlington Community Church
Kensington, CA

The Rev. Gail Cafferata, Interim Vicar
Holy Family Episcopal Church
Rohnert Park, CA

The Rev. Lucy Kolin
Resurrection Lutheran Church
Oakland, CA

Fr. Mac Collins
St. Mark's Episcopal Church
San Diego, CA

Rev. Richard Killmer
Program Director
Churches' Center for Theology and Public Policy, CA

The Rev. Michael Carney
Vicar, St. George's Episcopal Church
Antioch, CA

The. Rev. Carol Luther
Vicar, Church of the Redeemer
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Sister Patricia Krommer, CSJ
Sister of St. Joseph of Carondelet, CA

Rev. Dr. Thomas E. Ambrogi
Progressive Christians Uniting
Los Angeles, California

M. Theresa Basile
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Progressive Christians Uniting
Communications Director
Methodist Federation for Social Action
California-Pacific Chapter, CA

John B. Cobb, Jr.
Claremont School of Theology
Progressive Christians Uniting, CA

Rev. Robert I. Miller

Minnesota

The Rev. Ward J. Bauman
Director
The Episcopal House of Prayer
Collegeville, MN

New Mexico

Sister Rose Marie Cecchini, MM
Coordinator: Office of Peace, Justice & Creation Stewardship
Gallup, NM

Sister Joan Brown, OSF
Ecology Ministry
Albuquerque, NM

North Carolina

The Rt. Rev. J. Gary Gloster
Assisting Bishop
Episcopal Diocese of North Carolina, NC

The Rev. Thomas Droppers
Steering Committee Member
North Carolina Council of Churches/Interfaith Power & Light, NC

The Rev. Dr. Thomas W. Mann, Ph.D.
Parkway United Church of Christ
Winston Salem, NC

Tennessee

Rev. Doug Hunt
Clergy Representative
Tennessee Interfaith Power & Light, TN

Vermont

The Rev. Anita Schell-Lambert
Rector
St. Peter's Episcopal Church
Bennington, VT

Cheryl Mitchell, Quaker Clerk
Vergennes, VT

Rabbi Joshua Chasan
Ohavi Zedek Synagogue
Burlington, VT

Virginia

Rev. Stephen H. Brown
Director
Virginia Interfaith Power & Light, VA

Wisconsin

The Rev. Dale Klitzke
Menomonie, WI

CC: Members of Senate Environment and Public Works Committee

The Episcopal Church, USA • Evangelical Lutheran Church in America • Friends Committee on National Legislation • Maryknoll Office of Global Concerns • Mennonite Central Committee, US, Washington Office • National Council of the Churches of Christ in the USA • The United Methodist Church – General Board of Church and Society • Union of Reform Judaism

September 19, 2006

The United States Senate
Committee on Environment and Public Works
Washington, DC 20510

Dear Senators:

As leaders of the faith community, we applaud the Committee's willingness to hold hearings on the critical issue of global climate stewardship. We believe this is one of the defining moral and ethical issues for our generation and that immediate action is required to fulfill our call to care for God's earth.

God has called each of us to protect the poor, the voiceless and creation itself. Our faith traditions and denominational policies make clear that this call is a mandate requiring action. Just as a scientific consensus has emerged about the need to address atmospheric concentrations of greenhouse gases, so too a broad consensus among religious leaders and organizations has emerged to respond to our shared understanding of God's call for environmental stewardship and the care for our sisters and brothers around the world.

The impacts of global climate change will fall disproportionately on those individuals and nations least responsible for the crisis and least able to afford adaptive measures to mitigate the localized effects. For the richest nations – those most responsible for the problem – to abrogate their responsibility to address their emissions and instead place the burden of both the impacts and the solution on developing nations is unjust and immoral.

While we support partnerships that aim to provide cleaner energy and more efficient technologies around the world, we believe such partnerships must be coupled with concrete actions by the United States to reduce its greenhouse gas emissions. We urge the United States to reclaim its mantle of global leadership in the international environmental arena and pursue policy changes that would reduce its greenhouse gas emissions. As the richest nation on earth, the United States can and must modify its priorities to enact such changes while shielding residents with the least financial resources from further hardship.

In calling on the United States to lead by example, we recognize and remain committed to fulfilling our own responsibility to pursue changes in the lifestyles of our members that would reduce the emissions of individuals and communities of faith.

We look forward to working with the committee in the future as partners in our effort to restore God's creation.

Respectfully,

The Episcopal Church, USA
Evangelical Lutheran Church in America
Friends Committee on National Legislation
Maryknoll Office of Global Concerns
Mennonite Central Committee, US, Washington Office
National Council of Churches of Christ in the USA
The United Methodist Church – General Board of Church and Society
Union of Reform Judaism

Attachment: Guiding Church Policies on Climate Change/Global Warming

Guiding Church Policies on Climate Change/Global Warming

Episcopal Church

Global Warming Executive Council – June 2001

Resolved, that the Salt Lake City meeting of the Executive Council of the Episcopal Church urges the President of the United States to address the issue of global warming and take the necessary steps to reduce greenhouse gas emissions in the United States.

Resolved, that the Episcopal Church urges the President of the United States and Congress to provide financial support and leadership for developing nations to control their emissions of greenhouse gases in order to reduce the vulnerability to climate change and severe weather disasters.

Resolved, that the Episcopal Church urges the President of the United States and Congress to provide funds and leadership in an effort to encourage renewable energy, energy efficiency and conservation.

For the Explanation that accompanies this resolution, go to www.episcopalchurch.org/peace-justice/resolution_11.asp.

Quaker

On the need to address global climate change

Protecting God's Earth and its fullness of life is of fundamental religious concern to the Religious Society of Friends. The links between human activity, the dramatic rise in atmospheric greenhouse gas concentrations, and the rise of average global temperature are now of sufficient concern to lead us to action. Climate change is apt to affect everyone and everything: food, water, air quality, biodiversity, forests, public health, social order and world peace. It is therefore an issue of great importance for ecological sustainability, social and economic justice, and international diplomacy.

Because the United States uses much more energy per capita than any other nation, our policies to curtail greenhouse gas emissions will be crucial. We must consider not only the kind of fuels used directly but also the energy embodied in all material goods we use. Our nation has long set a standard for others with its high levels of consumption; we must now provide an example by taking responsibility for the consequences of past and current behavior.

Involvement by religious communities in education and advocacy will be needed if policies to address global warming are to succeed in politics or in practice in the US. We unite in urging individual Friends, monthly meetings, and other Friends organizations to seek Divine Guidance in understanding how to:

- reduce our own use of energy and material resources;
- support strong international agreements for reducing greenhouse gas emissions;
- participate in a transition to less damaging technologies in our industries, agriculture, buildings and transportation.

These are essential steps to protect life on Earth as God creates and sustains it.

- approved at the June 2000 session of Interim Meeting

Evangelical Lutheran Church in America

Global Warming*: Assembly Action CA01.07.57*

To reaffirm the commitment of this church to the care of creation, including global warming, as part of the web of complex interwoven environmental concerns, as detailed in the 1993 "Social Statement on Caring for Creation: Vision, Hope, and Justice";

To refer the memorials of the Saint Paul Area Synod and the Southeastern Minnesota Synod to the Division for Church in Society to consider developing or identifying appropriate resources for promoting understanding of this issue; and

To encourage individuals, congregations, synods, and churchwide units of this church to consider their activities in light of this issue.

United Methodist Church

Energy Policy Statement

Humankind enjoys a unique place in God's universe. On the one hand, we are simply one of God's many finite creatures, made from the "dust of the earth," bounded in time and space, fallible in judgment, limited in control, dependent upon our Creator, and interdependent with all other creatures. On the other hand, we are created in the very image of God, with the divine Spirit breathed into us, and entrusted with "dominion" over God's creation (Genesis 1:26, 28; 2:7; Psalm 8:6). We are simultaneously caretakers with all creation and, because of the divine summons, caretakers with God of the world in which we live. This hybrid human condition produces both the opportunity and the twin dangers for humans on this planet.

The first danger is arrogance: that we may overestimate the extent of human control over our environment and the soundness of human judgments concerning it; that we may underestimate the limits of the planet where we live; and that we may misunderstand "dominion" to mean exploitation instead of stewardship.

The second danger is irresponsibility: that we may fail to be the responsible stewards of the earth. As stewards entrusted with dominion, then, we will demonstrate our faith in God by shaping the new human society that will emerge in the twenty-first century. We cannot, therefore, neglect the task of seeking to embody in the world the values that we hold in covenant with God. Nor can we forget the forgiving grace in Jesus Christ, which alone makes us bold enough, or the hope in Christ, which alone keeps us from despair.

The Values Involved in Energy Policy
The decisions that humans are now making will either enhance or degrade the quality of life on the planet. We have entered an era of greater energy interdependence. As the world confronts global issues such as climate change, energy inequity, and pollution, energy-related problems will require international solutions based upon the values of justice and sustainability.

The Scripture that provides the motive for our action in the present energy crisis also lays the foundation for the values that we seek to realize. These values underlying the policies we advocate are justice and sustainability.

(1) Justice. Ever since the first covenant between God and Israel, and especially since the eighth-century prophets, the people of God have understood that they bear a special concern for justice.

"Let justice roll down like waters,

and righteousness like an everflowing stream" (Amos 5:24) is a cry echoed in hundreds of contexts throughout the Old and New Testaments.

Biblical righteousness includes a special concern for the least and the last: the poor, the captive, the oppressed (Luke 4:18; Isaiah 61:1-2). Energy policies that Christians can support, then, will seek to actualize the multifaceted biblical vision of justice. They will be policies that close rather than widen the gap dividing wealth and poverty, rich nations and poor. They will be measures that liberate rather than oppress. They will be programs that distribute fairly the benefits, burdens, and hazards of energy production and consumption, taking into consideration those not yet born as well as the living. They will thus be strategies that give priority to meeting basic human needs such as air, water, food, clothing, and shelter.

(2) Sustainability. Only recently have we humans come to recognize that creation entails limits to the resources entrusted to us as stewards of the earth. In particular, we have come up against limits to the nonrenewable fuels available for our consumption and limits to our environment's capacity to absorb poisonous wastes. These double limits mean that humans can betray their stewardship either by using up resources faster than they can be replaced or by releasing wastes in excess of the planet's capacity to absorb them. We now know that humans have the capacity to destroy human life and perhaps even life itself on this planet, and to do so in a very short period of time. Energy policy decisions, therefore, must be measured by sustainability as a criterion in addition to justice. In terms of energy policy, sustainability means energy use that will not: (a) deplete the earth's resources in such a way that our descendants will not be able to continue human society at the level that is adequate for a good quality of life, and (b) pollute the environment to such an extent that human life cannot be sustained in the future. These guidelines for sustainability must include considerations of quality of life as well as mere biological continuance.

We enjoy a highly sophisticated, industrialized world. It is not a realistic option for us to return to a world where people read by candlelight and heat with wood. Also, we should be aware of the tragic effects that steadily increasing energy costs will have, especially upon the aged and poor members of our society.

All options available to the rich nations are not open to peoples in other parts of the world; hence, we should endeavor to develop just and equitable energy policies.

We must creatively explore all sustainable energy options available to us. There are environmental problems connected with certain energy options. We believe that the environmental problems of each energy source should be fully assessed. For example, the large-scale use of our coal resources poses many problems. Underground mining, in addition to operational accidents, causes disabling illness or death from black lung. Strip-mining can despoil an area and ruin it for further use if restoration measures are not practiced. The burning of coal causes large-scale pollution and seriously alters the environment by increasing the carbon dioxide content of the atmosphere, contributing to global warming.

Hydroelectric power also has its problems. In addition to deaths from industrial accidents, many dam sites are (or were) attractive scenic areas. Destroying (or diminishing) such natural beauty areas is objectionable to most of us. Possible dam failure with the resultant flood damage must also be considered in evaluation of this source of power.

The use of petroleum products creates severe environmental problems. Tankers and offshore wells have created spills that have devastated seacoast areas; the damage is long-lasting or

permanent. Air pollution, far from being under control, is a serious health problem, especially in centers of dense population.

The nuclear energy option also has many problems to be faced. The hazards in storing radioactive wastes for thousands of years and the destructive potential of a catastrophic accident involve a great risk of irreversible damage to the environment or to the human genetic pool.

(1) We support strenuous efforts to conserve energy and increase energy efficiency. A transition to energy efficiency and renewable energy sources will combat global warming, protect human health, create new jobs, and ensure a secure, affordable energy future. Economists have concluded that a greater increase in end-use energy can be gained through conservation and energy efficiency than through any single new source of fuel. Furthermore, conservation is nonpolluting and job producing. We include under conservation: insulation, co-generation, recycling, public transportation, more efficient motors in appliances and automobiles, as well as the elimination of waste, and a more simplified lifestyle. The technology for such steps is already known and commercially available; it requires only dissemination of information and stronger public support, including larger tax incentives than are presently available.

(2) All United Methodist churches, annual conferences, general boards and agencies are to be models for energy conservation by doing such things as: installing dampers in furnaces, insulating adequately all church properties, heating and lighting only rooms that are in use, using air circulation, purchasing energy efficient appliances, and exploring alternative energy sources such as solar energy. Local churches, camps, and agencies are urged to become involved in programs such as the Energy Stewardship Congregation program, thereby witnessing our shared values of justice and sustainability.

(3) All United Methodist Church programs and mission projects must model our sustainable and just energy values. We particularly urge the United Methodist Committee on Relief (UMCOR) and the General Board of Global Ministries (GBGM) to support and fund renewable and energy efficient mission projects; and we urge the Church Architecture Office of the General Board of Global Ministries to make energy conservation and the use of renewables a prime design feature in new building design and renovations.

(4) We support increased government funding for research and development of renewable energy sources, especially solar energy, and government incentives to speed the application of the resulting technologies to our energy needs, wherever appropriate. The greatest national and international effort should be made in the areas of conservation and renewable energy sources.

(5) We encourage international lending institutions and aid agencies to promote sustainable and just energy policies.

(6) We oppose any energy policy that will result in continuing exploitation of indigenous peoples' lands. The despoiling of indigenous peoples' lands and the increased health and social-economic problems that have resulted because of oil exploration, hydroelectric projects, and the mining of coal and the milling of uranium must cease.

(7) We support national energy programs that will not increase the financial burden on the poor, the elderly, and those with fixed incomes. If a rapid rise in the price of fuel is necessary to smooth out distortions in the energy economy, as many economists believe, then means should be found to cushion the impact of such price increases on the poor. Furthermore, energy policies must guarantee universal service to all consumers, protecting low-income and rural residents.

(8) We support full cooperation of all nations in efforts to ensure equitable distribution of necessary energy supplies, the control of global warming, and rapid development and deployment of appropriate technologies based on renewable energy resources such as solar, wind, and water energy generation.

(9) We strongly encourage The United Methodist Church at all levels to engage in a serious study of these energy issues in the context of Christian faith, especially the values of justice and sustainability.

Adopted 1980.
Amended and Readopted 2000.

Union of Reform Judaism

Environmental Pollution Resolution - 1969

WHEREAS environmental pollution is a crime against life, it results from our highly industrialized, mechanical society and exploding populations, afflicting areas both urban and rural throughout the world. It effects, going unchecked, can end only in the tragedy of the destruction of all human life on earth.

The industrial and automotive pollution of our air has made the life process of breathing a dangerous health hazard in some areas. Industrial wastes, sewage and oil are contaminating many of our precious water resources. The penetration of poisonous pesticides into all living organisms is now becoming critical, thus disrupting the ecological balance of nature. This is especially the case with DDT. The indiscriminate use of DDT and other poisonous chemicals must be stopped now.

Time is running out and action to rectify the problems must be intensified. As responsible Jews, we must show respect for the quality of life. We who inherit a tradition which is marked by a reverence for life must preserve the earth and all its varied life for our own sake and for generations yet unborn.

THEREFORE, THE 50TH GENERAL ASSEMBLY OF THE UAHC RESOLVES:

1. to urge that appropriate measures be taken by local, state and national governments to remove or ameliorate the growing threats of environmental pollution and to afford protection to the environment;
2. to urge individuals and businesses in the private sector to cooperate in actions designed to reduce environmental pollution and afford protection to the environment;
3. to urge national commissions, regions and congregations to become actively interested in the problem of environmental pollution and the protection of the environment through study, cooperation and action alongside interested communal agencies which are working in this field.

Dominion. Stewardship. Conservation.

Interfaith Stewardship Alliance

An Open Letter to the Signers of
"Climate Change: An Evangelical Call to Action"
and Others Concerned About Global Warming

"They only asked us to remember the poor–the very thing I was eager to do."
–The Apostle Paul, Galatians 2:10

Widespread media reports tell of a scientific consensus that:

- the world is presently experiencing unprecedented global warming;
- the main cause of it is rising atmospheric carbon dioxide because of human use of fossil fuels for energy; and
- the consequences of continuing this pattern will include (1) rising sea levels that could inundate highly populated and often poor low-lying lands, (2) more frequent deadly heat waves, droughts, and other extreme weather events, (3) increased tropical diseases in warming temperate regions, and (4) more frequent and intense hurricanes.

Recently eighty-six evangelical pastors, college presidents, mission heads, and other leaders signed "Climate Change: An Evangelical Call to Action," under the auspices of the Evangelical Climate Initiative. The document calls on the federal government to pass national legislation requiring sufficient reductions in carbon dioxide emissions to fight global warming and argues that these are necessary to protect the poor from its harmful effects.

In light of all this, many people are puzzled by the Interfaith Stewardship Alliance's opposition to such calls. Do we not *care* about the prospect of catastrophic global warming? Do we not *care* that with rising temperatures the polar ice caps will melt, and the sea will inundate low island countries and coastal regions? Do we not *care* that the world's poor might be most hurt by these things?

Yes, we care. But we also believe, with economist Walter Williams, that "truly compassionate policy requires dispassionate analysis." That is the very motive for our opposing drastic steps to prevent global warming. In short, we have the same motive proclaimed by the Evangelical Climate Initiative in its "Call to Action."

But motive and reason are not the same thing. It matters little how well we mean, if what we do actually harms those we intend to help.

That is why we take the positions we do. In the accompanying document, **"A Call to Truth, Prudence,**

and Protection of the Poor: An Evangelical Response to Global Warming," we present extensive evidence and argument against the extent, the significance, and perhaps the existence of the much-touted scientific consensus on catastrophic human-induced global warming. Further, good science–like truth–is not about counting votes but about empirical evidence and valid arguments. Therefore we also present data, arguments, and sources favoring a different perspective:

- Foreseeable global warming will have moderate and mixed (not only harmful but also helpful), not catastrophic, consequences for humanity–including the poor–and the rest of the world's inhabitants.

- Natural causes may account for a large part, perhaps the majority, of the global warming in both the last thirty and the last one hundred fifty years, which together constitute an episode in the natural rising and falling cycles of global average temperature. Human emissions of carbon dioxide and other greenhouse gases are probably a minor and possibly an insignificant contributor to its causes.

- Reducing carbon dioxide emissions would have at most an insignificant impact on the quantity and duration of global warming and would not significantly reduce alleged harmful effects.

- Government-mandated carbon dioxide emissions reductions not only would not significantly curtail global warming or reduce its harmful effects but also would cause greater harm than good to humanity–especially the poor–while offering virtually no benefit to the rest of the world's inhabitants.

- In light of all the above, the most prudent response is not to try (almost certainly unsuccessfully and at enormous cost) to prevent or reduce whatever slight warming might really occur. It is instead to prepare to adapt by fostering means that will effectively protect humanity–especially the poor–not only from whatever harms might be anticipated from global warming but also from harms that might be fostered by other types of catastrophes, natural or manmade.

We believe the harm caused by mandated reductions in energy consumption in the quixotic quest to reduce global warming will far exceed its benefits. Reducing energy consumption will require significantly increasing the costs of energy–whether through taxation or by restricting supplies. Because energy is a vital component in producing all goods and services people need, raising its costs means raising other prices, too. For wealthy people, this might require some adjustments in consumption patterns–inconvenient and disappointing, perhaps, but not devastating. But for the world's two billion or more poor people, who can barely afford sufficient food, clothing, and shelter to sustain life, and who are without electricity and the refrigeration, cooking, light, heat, and air conditioning it can provide, it can mean the difference between life and death.

Along with all the benefits we derive from economic use of energy, another consideration–a Biblical/theological one–points in the same direction. The stewardship God gave to human beings over the earth–to cultivate and guard the garden (Genesis 2:15) and to fill, subdue, and rule the whole earth (Genesis 1:28)–strongly suggests that caring for human needs is compatible with caring for the earth. As theologian Wayne Grudem put it, "It does not seem likely to me that God would set up the world to work in such a way that human beings would eventually destroy the earth by doing such ordinary and morally good and necessary things as breathing, building a fire to cook or keep warm, burning fuel to travel, or using energy for a refrigerator to preserve food."

Whether or not global warming is largely natural, (1) human efforts to stop it are largely futile; (2) whatever efforts we undertake to stem our small contributions to it would needlessly divert resources from much more beneficial uses; and (3) adaptation strategies for whatever slight warming does occur are much more sensible than costly but futile prevention strategies. Therefore, we believe it is far wiser to promote economic growth, partly through keeping energy inexpensive, than to fight against potential global warming and thus slow economic growth. And there is a side benefit, too: wealthier societies are better able and more willing to spend to protect and improve the natural environment than poorer societies. Our policy, therefore, is better not only for humanity but also for the rest of the planet.

We recognize that reasonable people can disagree with our understanding of the science and economics. But this is indeed our understanding.

Please join us in endorsing **"A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming."** To do so, send an e-mail with your name, degree(s) (with subject, level, and granting institution), professional title, professional affiliation (for identification purposes only), mailing address, e-mail address, and (for verification) phone number to isa@interfaithstewardship.org. If you have questions, please e-mail the same address.

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A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming

By E. Calvin Beisner, Ph.D., Paul K. Driessen, Esq., Ross McKitrick, Ph.D., and Roy W. Spencer, Ph.D.

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A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming

Preamble

As evangelicals, we commend those who signed the Evangelical Climate Initiative's "Climate Change: An Evangelical Call to Action" for speaking out on a public issue of ethical concern. We share the same Biblical world view, theology, and ethics. We are motivated by the same deep and genuine concern they express for the poor not only of our own nation but of the world. That very concern compels us to express our disagreement with their "Call to Action" and to offer an alternative that would improve the lot of the poor more surely and effectively.

It is important to speak directly to the issue of motive. We do not question the motive of those who produced or signed the ECI's "Call to Action." We assume that they acted out of genuine concern for the world's poor and others and considered their action justified by scientific, economic, theological, and ethical facts. We trust that they will render us the same respect.

It is not sufficient, however, to have good intentions. They must be linked to sound understanding of relevant principles, theories, and facts. As we shall argue below, that linkage is lacking for the ECI's "Call to Action."

We present our case in two stages. First, we respond point-by-point to the ECI's four claims and the four assumptions on which its "Call to Action" rests. Second, we present five contrary conclusions. The first four follow from the evidence presented in our critique of the ECI's claims. The fifth sets forth our own alternative call to action to protect the poor, the rest of humanity, and the rest of the world's inhabitants–not only from global warming but also from other potential environmental threats.

Response to the ECI's Four Assumptions

The ECI's "Call to Action" rests on the following four assumptions:

- Human emissions of carbon dioxide and other greenhouse gases into the atmosphere as we burn fuels for energy are the main cause of global warming.
- Global warming is not only real (which we do not contest) but is almost certainly going to be catastrophic in its consequences for humanity–especially the poor.
- Reducing carbon dioxide emissions would so curtail global warming as to significantly reduce its anticipated harmful effects.
- Mandatory carbon dioxide emissions reductions would achieve that end with overall effects that would be more beneficial than harmful to humanity and the rest of the world's inhabitants.

All of these assumptions, we shall argue below, are false, probably false, or exaggerated.

ECI's First Assumption: CO_2 emissions from fossil fuels are the main cause of warming.

The ECI's **first assumption** appears under "Claim 1: **Human-Induced Climate Change is Real**." While almost certainly true (since humans have long affected climates in which they live), the claim is too vague to have policy implications. It is *possible*, under some assumptions, to attribute *all* recent globally averaged warming to mankind. But our knowledge of climate history also reveals substantial natural variability. The mechanisms driving natural climate variations are too poorly understood to be included accurately in computer climate models. Hence, the models risk overstating human influence.

For support the "Call" cites the Executive Summary of the *Third Assessment Report* (2001) of the Intergovernmental Panel on Climate Change (IPCC) as attributing "*most* of the warming" (emphasis added) to human activities. However, the Executive Summary does not reflect the depth of scientific uncertainty embodied in the report and was written by government negotiators, not the scientific panel itself. Indeed, the wording of the conclusion supplied by the scientific panel as of the close of scientific review did not attribute "most" warming to humans. Instead it emphasized the existing uncertainties: "From the body of evidence since IPCC (1996), we conclude that there has been *a discernible* human influence on global climate. Studies are beginning to separate the contributions to observed climate change attributable to individual external influences, both anthropogenic and natural. This work suggests that anthropogenic greenhouse gases are *a substantial* contributor to the observed warming, especially over the past 30 years. However, the accuracy of these estimates continues to be limited by *uncertainties* in estimates of internal variability, natural and anthropogenic forcing, and the climate response to external forcing."[1] While much valuable scientific research is reflected by the IPCC's reports, their executive summaries have been so politicized as to prompt MIT climate scientist and IPCC participant Richard Lindzen to testify before the United States Senate, "I personally witnessed coauthors forced to assert their 'green' credentials in defense of their statements."[2]

Further, a number of studies support the conclusion that natural causes–e.g. fluctuations in solar output,[3] changes in cloud forcing,[4] and precipitation microphysics[5]–could outweigh human CO_2

[1]Government and Expert Review Draft, IPCC Working Group 1 Third Assessment Report, 5, emphases added. The "IPCC is as much a collection of government bureaucrats as it is of working scientists. . . . only about 33 percent of the 200+ 'lead authors' are in fact climate scientists. Consequently, the 'consensus' that these documents achieve is in fact determined by a majority opinion that is not necessarily formally trained in the subject matter." Patrick J. Michaels, *Meltdown: The Predictable Distortion of Global Warming by Scientists, Politicians, and the Media* (Washington: Cato Institute, 2004), 22.

[2]"Testimony of Richard S. Lindzen before the Senate Environment and Public Works Committee on 2 May 2001," online at http://epw.senate.gov/107th/lin_0502.htm.

[3]The IPCC attributes the whole warming of the first half of the twentieth century–about 0.5° C–to solar variability. John T. Houghton, *et al.*, *Climate Change 2001: The Scientific Basis. Contribution of Working Group 1 to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2001),

emissions as causes of the current global warmth.[6] Other studies find that rising CO_2 follows rather than leads warming and thus is not its cause but might be its effect.[7] In addition, other human activities (e.g., land use conversion for agriculture and cities, particulate pollution) cause regional climatic changes that go largely unmentioned. Thus the human-induced part of the warming trend is only partly driven by CO_2 and other manmade greenhouse gases. Recently sixty topic-qualified scientists asserted that "global climate changes all the time due to natural causes and the human impact still remains impossible to distinguish from this natural noise," and that "observational evidence does not support today's computer climate models, so there is little reason to trust model predictions of the future."[8]

The discerning reader of the ECI statement should ask: *How much* of current global warming is man-made versus natural? *How much* future warming can we reasonably expect? *What changes* in human behavior that affect climate may be anticipated, under *what conditions*? *What difference* will such changes make to the world's climate? And what would it actually take *to fix the alleged problem*? In other words, the **first assumption**, which by itself suggests no policy, only becomes relevant when coupled with the second.

ECI's Second Assumption: Global Warming Will Be Catastrophic, Especially for the Poor

The ECI's **second assumption** appears under "Claim 2: **The Consequences of Climate Change**

697.

[4]A discussion of cloud variations as a cause of natural climate variability is contained in Climate Research Committee, Board on Atmospheric Sciences and Climate, Commission on Geosciences, Environment, and Resources of the National Research Council, "Natural Climate Variability On Decade-to-Century Time Scales" (Washington, D.C.: National Academy Press, 1995), online at: http://darwin.nap.edu/books/0309054494/html.

[5]The precipitation efficiency uncertainties in climate modeling (and thus our theoretical understanding of how these things can be involved in natural climate fluctuations) are discussed in N. O. Renno, K.A. Emanuel, and P.H. Stone, "Radiative-convective model with an explicit hydrologic cycle 1. Formulation and sensitivity to model parameters," *Journal of Geophysical Research* 99 (July 10, 1994), 14,429-14,441. The end of the abstract says: "The cumulus convection schemes currently in use in general circulation models bypass the microphysical processes by making arbitrary moistening assumptions. We suggest they are inadequate for climate change studies."

[6]Such natural causes–especially fluctuations in solar energy output, changes in earth's orbit and tilt (The Marian Koshland Science Museum of the National Academy of Sciences explains and illustrates these well in "Global Warming Facts & Our Future" at http://www.koshland-science-museum.org/exhibitgcc/causes08.jsp.), and other long and (geologically) short cycles–certainly outweigh human CO_2 emissions as causes of climate change in history. See, e.g., S. Fred Singer and Dennis T. Avery, "The Physical Evidence of Earth's Unstoppable 1,500-Year Climate Cycle" (Dallas: National Center for Policy Analysis, NCPA Policy Report No. 279, 2005).

[7]Robert H. Essenhigh, "Does CO_2 really drive global warming?" *Chemical Innovation* 31:5 (May 2001), 44-46; online at http://www.pubs.acs.org/subscribe/journals/ci/31/special/may01_viewpoint.html; H. Fischer, *et al.*, "Ice core record of atmospheric CO_2 around the last three glacial terminations," *Science* 283, (1999): 1712-1714; U. Siegenthaler, et al., "Stable carbon cycle-climate relationship during the late Pleistocene," *Science* 310:5752 (November 25, 2005), 1313-1317.

[8]Letter to Canadian Prime Minister Stephen Harper, published as "Open Kyoto to debate: Sixty scientists call on Harper to revisit the science of global warming," *Financial Post*, April 6, 2006, at http://www.canada.com/nationalpost/financialpost/story.html?id=3711460e-bd5a-475d-a6be-4db87559d605. A complete list of signers of this letter is in the Appendix of this paper.

Will Be Significant, and Will Hit the Poor the Hardest." We shall respond separately to the two parts of this claim.

The first part asserts that "the consequences of climate change will be significant." It is impossible to quantify what is meant by "significant," but the "Call to Action" goes on to list a variety of consequences, asserts without evidence that these will be hardest on the poor, and concludes, "Millions of people could die in this century because of climate change, most of them our poorest global neighbors."

> The "claim that climate sensitivity has as much as a 5% chance of exceeding 4.5° C is not a position that we would care to defend with any vigour, since . . . we are unaware of any significant evidence in favour of such a high value."–J. D. Annan and J. C. Hargreaves

Catastrophic climate scenarios critically depend on the extremely unlikely assumption that global average temperature would rise 6° C (10.8° F) or more in response to doubled CO_2. But more credible estimates of climate sensitivity to doubled CO_2 have been in the range of 1.5° to 4.5° C (2.7° to 8.1° F). Researchers using several independent lines of evidence asserted a "maximum likelihood estimate . . . close to 3° C" (5.4° F). They concluded, "our implied claim that climate sensitivity actually has as much as a 5% chance of exceeding 4.5° C is not a position that we would care to defend with any vigour, since even if it is hard to formally rule it out, we are unaware of any significant evidence in favour of such a high value."[9] It is very unlikely that warming in that range would cause catastrophic consequences. Why? Among other reasons, because CO_2-induced warming will occur mostly in winter, mostly in polar regions, and mostly at night. But in polar regions, where winter night temperatures range far below freezing, an increase of 5.4° F is hardly likely to cause significant melting of polar ice caps or other problems.

Even if the recent strong warming trend (at most 1° F in the last thirty years) is entirely manmade (and it almost certainly is not), and even if it continues for another thirty years (as it might), global average temperature will only be at most 1° F warmer then than now. Predicting climate beyond then depends on assumptions about future use of fossil fuels. Such assumptions are dubious in light of continuous changes in energy sources throughout modern human history. Who could have predicted our current mix of energy sources a century-and-a-half ago, when wood, coal, and whale oil were the most important components and petroleum and natural gas were barely in use?

The ECI predicts that "*even small rises* [emphasis added] in global temperatures will have" a variety of supposedly disastrous impacts. In each instance, there is good reason to reject the prediction:

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[9] J. D. Annan and J. C. Hargreaves, "Using multiple observationally-based constraints to estimate climate sensitivity," *Geophysical Research Letters*, vol. 33, L06704, doi:10.1029/2005GL025259, 2006, online at http://www.agu.org/pubs/crossref/2006/2005GL025259.shtml; prepublication draft at http://www.jamstec.go.jp/frcgc/research/d5/jdannan/GRL_sensitivity.pdf. See also G. Hegerl, et al., "Climate sensitivity constrained by temperature reconstructions over the past seven centuries," *Nature* 440 (April 20, 2006): 1029-1032.

- **"sea level rise":** Contrary to visions of seawater inundating vast areas, model-average results from a mid-range scenario of the IPCC (a scenario that itself probably exaggerates warming) suggest a rise by A.D. 2100 of only about 0.387 meter (15.24 inches, or 1.27 feet).[10] The rate of rise would be only 1.524 inches per decade, to which the few coastal settlements actually threatened could readily adapt by building dikes. Further, sea level has risen for centuries, since long before earth began to recover from the Little Ice Age (about 1550-1850) and long before fossil fuel burning could possibly have contributed to global warming. Through the twentieth century it rose about 0.18 meter (7.08 inches), and there is no reason to think the natural forces driving that rise will cease.[11] Even assuming that the IPCC's projection of twenty-first century sea level rise is correct, then, only about half of that rise would be attributable to current global warming–and, in turn, only a fraction of that to human-induced warming. Further, "Of the costs to the Netherlands, Bangladesh and various Pacific islands [i.e., the places at greatest risk], the costs of adapting to the changes in sea level are trivial compared with the costs of a global limitation of CO_2 emissions to prevent global warming."[12]

> IPCC mid-range scenario for sea level rise suggests only about 1.524 inches per decade, to which coastal settlements could readily adapt by building dikes.

- **"more frequent heat waves":** Though there is reason to doubt this prediction, its significance arises only from its impact on health and mortality. Heat-related death rates decline as people learn how, and become better able to afford, to protect themselves from excessive heat.[13] For example, while a heat wave in Chicago in 1995 caused about 700 heat-related deaths, a nearly

[10]Sarah C. B. Raper and Roger J. Braithwaite, "Low sea level rise projections from mountain glaciers and ice caps under global warming," *Nature* 439 (January 19, 2006), 311-313; abstract online at http://www.nature.com/nature/journal/v439/n7074/abs/nature04448.html. Similarly, Indur M. Goklany writes, "In the IPCC's First Assessment Report , the estimated SLR between 1990 and 2100 was pegged at between 0.31 and 1.10 m with a best estimate of 0.66 m (FAR Scientific Assessment, page 277), and the Third Assessment Report's estimates were between 0.09 and 0.88 m with a 'central value' of 0.48m (TAR Scientific Assessment, page 671). Recently Church and White (2006) came out with an estimate of between 0.28 and 0.34 m." Indur M. Goklany, "Comments to the Stern Review on the Economics of Climate Change," March 17, 2006, at http://members.cox.net/goklany/Stern%202.pdf, p. 4, citing John A. Church and Neil J. White, "A 20th century acceleration in global sea-level rise," *Geophysical Research Letters*, vol. 33 (January 6, 2006), L01602, doi:10.1029/2005GL024826, abstract online at http://www.agu.org/pubs/crossref/2006/2005GL024826.shtml.

[11]B. C. Douglas and W. R. Peltier, *Physics Today*, March, 2002, 35-40; compare Church and White (2006), which estimates sea level rise from January 1870 to December 2004 of 0.195 m (4.21 inches), i.e., 0.015 m (0.31 inch) per decade.

[12]Deepak Lal, "Ecological Imperialism: The Prospective Costs of Kyoto for the Third World," in *The Costs of Kyoto: Climate Change Policy and Its Implications*, ed. Jonathan H. Adler (Washington: Competitive Enterprise Institute, 1997), 83-90, at 85-6. An implication of this is that economic development is an important step to protecting against heat waves, with or without global warming; a further implication is that because energy is a crucial component of economic development, affordable energy is necessary to protect against heat waves.

[13]R. E. Davis, *et al.*, "Decadal changes in heat-related human mortality in the eastern United States," *International Journal of Biometeorology* 47:166-75.

identical one only four years later caused only about 100, because of better advance warning from weather forecasters and protective steps.[14] Further, those who warn of more frequent heat waves should even more fervently herald less frequent severe cold snaps. The death rate from severe cold is nearly ten times as high as that from severe heat,[15] implying that global warming (assuming that it reduces cold snaps as much as it increases heat waves) should prevent more deaths from cold than it causes from heat.

- **"more frequent . . . droughts, and extreme weather events such as torrential rains and floods":** Actual projections assuming IPCC-forecast global warming call for more frequent droughts in some places, less frequent droughts in others, more frequent wet periods in some places, and less frequent wet periods in others. It is not possible, at the present state of the science, to be sure whether there will be a net increase of either droughts or wet periods globally or in most locales. However, while worldwide data are insufficient to justify any generalizations, we do know that there is no statistical correlation between global average temperature and droughts in the southwestern United States or even the United States as a whole,[16] a fact that puts the model forecasts into doubt. Further, in an increasingly wealthy world, the ability to distribute water and agricultural products efficiently will continue to improve, making societies more and more resilient to droughts–which will continue to occur with or without human influence on climate.

- **"increased tropical diseases in now-temperate regions":** Since the mosquitoes that carry *Plasmodium falciparum* (the malaria-causing parasite) require winter temperatures above about 61° to 64° F to survive, it seems intuitively likely that expanding the regions with winter lows above that range would result in increasing malaria rates. However, even in very cold climates there are places sheltered from cold in which the mosquitos can hibernate. Thus, malaria was common throughout Europe and even into the Arctic Circle even during the Little Ice Age and continued common through the end of World War II in Finland, Poland, Russia, around the Black Sea, and in thirty-six of the United States, including all northern border states from Washington through New York.[17] It is not temperatures that are most important for malaria control but elimination of suitable breeding grounds and the use of pesticides to lower the population of malarial mosquitoes and keep them out of homes. The

> The impacts of climate change on malaria, at least through 2084, will be trivial compared to non-climate change related factors.

[14] M. A. Palecki, S. A. Changnon, and K. E. Kunkel, "The nature and impacts of the July 1999 heat wave in the midwestern United States: Learning from the lessons of 1995," *Bulletin of the American Meteorological Society* 82:1353-1367.

[15] W. R. Keatinge, *et al.*, "Heat related mortality in warm and cold regions of Europe: observational study," *British Medical Journal* 321:670-673.

[16] O. W. Frauenfeld and R. E. Davis, "Midlatitude circulation patterns associated with decadal and interannual Pacifc Ocean variability," *Geophysical Research Letters* 29, DOI: 10.1029/2002GL015743; Michaels, *Meltdown*, 138-142.

[17] Paul Reiter, "From Shakespeare to Defoe: malaria in England in the Little Ice Age," *Emerging Infectious Diseases* 6(1):1-10, at www.cdc.gov/ncidod/eid/vol6no1/reiter.htm.

IPCC suggested on the basis of mathematical models that by the 2080s global warming could put about 2-4 percent more people at risk for malaria. What this means is that 96 to 98 percent of people at risk of malaria would be at risk because of non-climate change related factors. In other words, the impacts of climate change on malaria, at least through 2085, will be trivial compared to non-climate change related factors.[18] The IPCC also noted that most of those newly at risk would be in middle- or high-income countries where infrastructure and health services would make infection and death or serious disability unlikely.[19] "Thus, the global study of *actual* malaria transmission shows 'remarkably few changes, even under the most extreme scenarios.'"[20] The resurgence of malaria in some African and Asian countries correlates not with changing temperatures but with the banning of DDT and shifts to less effective disease control methods, and it costs over a million premature deaths annually.

- **"hurricanes that are more intense":** The recent upswing in numbers and intensity of Atlantic hurricanes makes some people more receptive to claims that global warming might have such an effect. However, the National Oceanic and Atmospheric Administration (NOAA) concluded in a study announced in November 2005 that "the tropical multi-decadal signal is causing the increased Atlantic hurricane activity since 1995, and is not related to greenhouse warming."[21] More specifically,

> The National Oceanic and Atmospheric Administration concluded in a study announced in November 2005 that "the tropical multi-decadal signal is causing the increased Atlantic hurricane activity since 1995, and is not related to greenhouse warming."

> claims of linkages between global warming and hurricane impacts are premature for three reasons. First, no connection has been established between greenhouse gas emissions and the observed behavior of hurricanes (Houghton et al. 2001; Walsh 2004). . . . Second, the peer-reviewed literature reflects that a scientific consensus exists that any future changes in hurricane intensities will likely be small in the context of observed variability (Knutson and Tuleya 2004; Henderson-Sellers et al. 1998), while the scientific problem of tropical cyclogenesis is so far from being solved that little can be said about possible changes in frequency. And third, under the assumptions of the IPCC,

[18] I. M. Goklany and D. King, "Climate Change and Malaria," *Science* 306:5693 (October 2004), 55-57.

[19] J. J. McCarthy, *et al.*, *Climate Change 2001: Impacts, Adaptation, and Vulnerability: Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press, 2001), 9.7.1.1. Cited in Bjørn Lomborg, *The Skeptical Environmentalist: Measuring the Real State of the World*, rev. ed. (Cambridge: Cambridge University Press, 2001), 292.

[20] Lomborg, *Skeptical Environmentalist*, 292, citing David J. Rogers and Sarah E. Randolph, "The Global Spread of Malaria in a Future, Warmer World," *Science* 289(5485):1763-6. See also S. I. Hay, *et al.*, "Climate change and the resurgence of malaria in the East African highlands," *Nature* 415:905-09, which concluded that there was no correlation between malaria transmission and temperature variation.

[21] "NOAA attributes recent increase in hurricane activity to naturally occurring multi-decadal climate variability," *NOAA Magazine Online*, Story 184, at http://www.magazine.noaa.gov/stories/mag184.htm.

> expected future damages to society of its projected changes in the behavior of hurricanes are dwarfed by the influence of its own projections of growing wealth and population (Pielke et al. 2000).[22]

We have been in a cyclical lull in Atlantic hurricane activity for several decades, during which our coastlines have seen rapid growth in population and infrastructure. It is thus the presence of more property in harm's way, not a historically unprecedented increase in frequency or intensity of hurricanes, that explains rising economic losses from hurricanes. The National Hurricane Center has warned that we were overdue for a return to greater activity, similar to what occurred in the 1930s to the 1950s. Emphasis on a possible human connection distracts from the very real issue that people need to be prepared for increased hurricane activity, whether or not hurricanes' frequency, intensity, or duration are affected by manmade greenhouse gases.

- **"reduction in agricultural output, especially in poor countries":** Observational evidence and computer models yield little confidence in forecasts of the impact of global warming on agricultural production, whether in poor countries or elsewhere.[23] However, rising CO_2–presumably what drives global warming–enhances agricultural yield. For every doubling of atmospheric CO_2 concentration, there is an average 35 percent increase in plant growth efficiency. Plants grow better in warmer and colder temperatures and in drier and wetter conditions, and they are more resistant to diseases and pests. Consequently their ranges and yields increase.[24] Agricultural productivity worldwide and in developing countries has never been higher than it is today.[25] Three likely results of rising CO_2 are shrinking deserts, lower food prices, and reduced demand for agricultural land to feed the world's population, the latter resulting in reduced pressure on

For every doubling of atmospheric CO_2 concentration, there is an average 35 percent increase in plant growth efficiency. . . . Consequently their ranges and yields increase.

[22]R. A. Pielke Jr., *et al.*, "Hurricanes and Global Warming," *Bulletin of the American Meteorological Society*, November 2005, 1571-75, citing IPCC's *Climate Change 2001*; K. Walsh, "Tropical cyclones and climate change: Unresolved issues," *Climate Research* (2004) 27:78-83; T. R. Knutson and R. E. Tuleya, "Impact of CO_2-induced warming on simulated hurricane intensity and precipitation: Sensitivity to the choice of climate model and convective parameterization," *Journal of Climate* (2004) 17:3477-95; A. Henderson-Sellers, *et al.*, "Tropical cyclones and global climate change: A post-IPCC assessment," *Bulletin of the American Meteorological Society* (1998), 79:9-38; R. A. Pielke Jr. and D. Sarewitz, "Turning the big knob: Energy policy as a means to reduce weather impacts," *Energy and Environment* (2000) 11:255-76.

[23]Lauren Sacks and Cynthia Rosenzweig, "Climate Change and Food Security," at http://www.climate.org/topics/agricul/index.shtml.

[24]Many studies have been published demonstrating the benefits of rising CO_2 to agriculture. Much of the work has been done by scientists at the Center for the Study of Carbon Dioxide and Global Change, http://www.co2science.org/scripts/CO2ScienceB2C/Index.jsp, which has links to many articles by both its own scientists and others.

[25]I. M. Goklany, "Potential Consequences of Increasing Atmospheric CO_2 Concentration Compared to Other Environmental Problems," *Technology* 7 Suppl. 1 (2000), 189-213.

habitat and consequently on species survival. These benefits would be reduced or forgone if we reduced atmospheric CO_2.

> Claims of dangerous or catastrophic global warming are founded primarily on outlier models that present far more extreme scenarios than the vast majority [and] are based on grossly unrealistic assumptions about future factors that do not reflect current facts or likely future situations.

In sum, to support its claims that human-induced global warming is not only real but also bound to become catastrophic, the ECI either misreads the IPCC's reports or, following the example of the media and politicians, uncritically relies on its Summary for Policy Makers. The Summary, as we noted above, does not reflect the scientific uncertainty contained in the body of the report, was not agreed to by the vast majority of IPCC scientists, and was politically driven. Claims of dangerous or catastrophic global warming are founded primarily on outlier models that present far more extreme scenarios than the vast majority. These outlier models can neither predict even one year into the future nor reconstruct one year into the past. They produce scenarios with no basis in actual evidence. They are based on grossly unrealistic assumptions about future energy use, dominant energy types, pollution levels, economic development, and other factors that do not reflect current facts or likely future situations.[26] Mainstream media generally report on worst-case scenarios and assume that warming will be catastrophic and will bring devastating harm but no benefits. The ECI's statement follows that model.

There is evidence that the current warming period, from the mid-1800s to the present and likely to continue for a century or more, is driven largely by natural causes. Major global and regional climate changes of equal or greater magnitude–the Roman and Medieval Warm Periods, the Little Ice Age, and civilization-killing droughts in the Yucatan and the American southwest, not to mention the ice ages and interglacial periods–are known to have occurred in the complete absence of significant human impact. Yet the ECI, while presenting no evidence that natural causes are *not* the primary driving forces, endorses a response policy that is not only potentially very harmful but also irrational if the current warming is driven largely by natural causes.

What About Scientific Consensus on Human-induced Global Warming?

Before dealing with the effects on the poor, and since what we argue runs counter to a popularly perceived consensus among scientists on global warming, we must also address the ECI's claim, "Since 1995 *there has been general agreement* [emphasis added] among those in the scientific community most seriously engaged with this issue that climate change is happening and is being caused mainly by human activities . . . ." We should like to make three points. First, unlike politics,

[26] IPCC, SRES. See I. M. Goklany, "Is a Richer-but-warmer World Better than Poorer-but-cooler Worlds?" 25th Annual North American Conference of the US Association for Energy Economics/International Association of Energy Economics, September 21-23, 2005.

but like truth, science is not a matter of consensus but of data and valid arguments. Second, as Thomas Kuhn so famously pointed out in *The Structure of Scientific Revolutions*, great advances in science, often involving major paradigm shifts, occur when small minorities patiently–and often in the face of withering opposition–point out anomalies in the data and inadequacies in the reigning explanatory paradigms until their number and weight become so large as to require a wholesale paradigm shift, and what once was a minority view becomes a new majority view. Indeed, skepticism is essential to science: "Most institutions demand unqualified faith; but the institution of science makes skepticism a virtue."[27]

> "Most institutions demand unqualified faith; but the institution of science makes skepticism a virtue."–Robert K. Merton

Third, the popular belief that there is such a consensus is dubious at best. Since 1998 over 19,700 scientists have signed a petition saying, "There is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gasses is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate. Moreover, there is substantial scientific evidence that increases in atmospheric carbon dioxide produce many beneficial effects upon the natural plant and animal environments of the Earth." The signers include "2,660 physicists, geophysicists, climatologists, meteorologists, oceanographers, and environmental scientists who are especially well qualified to evaluate the effects of carbon dioxide on the Earth's atmosphere and climate" and "5,017 scientists whose fields of specialization in chemistry, biochemistry, biology, and other life sciences make them especially well qualified to evaluate the effects of carbon dioxide on the Earth's plant and animal life."[28]

In 2004 *Science* published the results of a study by Naomi Oreskes claiming that "without substantial disagreement, scientists find human activities are heating the earth's surface."[29] But an attempt at replicating the study both found that she had made serious mistakes in handling data and, after re-examining the data, reached contrary conclusions. Oreskes claimed that an analysis of 928 abstracts in the ISI database containing the phrase "climate change" proved the alleged consensus. It turned out that she had searched the database using three keywords ("global climate change") instead of the two ("climate change") she reported–reducing the search results by an order of magnitude. Searching just on "climate change" instead found almost 12,000 articles in the same

[27]Robert K. Merton, "Science and the Social Order," *Philosophy of Science* 5:3 (July 1938), 321-337, at 334.

[28]See the Oregon Petition Project at http://www.oism.org/pproject/s33p37.htm. Dr. Art Robinson, an evangelical who managed the project and keeps the signature list up to date, reports that additional scientists continue to sign the petition regularly, and almost none have removed their signatures in the nine years the petition has been in existence. For a complete list of signers, separate lists of those with specialized qualifications, and refutation of attempts to discredit the Petition, see http://www.oism.org/pproject/s33p357.htm. Similarly, since 1995 over 1,500 topic-qualified scientists have signed the Leipzig Declaration opposing the Kyoto Protocol (http://www.sepp.org/leipzig.html). Forty-seven topic-qualified scientists who reject the hypothesis of catastrophic human-induced global warming are listed at http://www.envirotruth.org/myth_experts.cfm, complete with contact information and notes on their subjects of expertise.

[29]Naomi Oreskes, "The scientific consensus on climate change," *Science*, vol. 306, issue 5702 (December 3, 2004), 1686, at http://www.sciencemag.org/cgi/content/full/306/5702/1686.

database in the relevant decade. Excluded from Oreskes's list were "countless research papers that show that global temperatures were similar or even higher during the Holocene Climate Optimum and the Medieval Warm Period when atmospheric CO_2 levels were much lower than today; that solar variability is a key driver of recent climate change; and that climate modeling is highly uncertain." Further, even using the three key words she actually used, "global climate change," brought up 1,247 documents, of which 1,117 included abstracts. An analysis of those abstracts showed that

- only 1 percent explicitly endorsed what Oreskes called the "consensus view";
- 29 percent implicitly accepted it "but mainly focus[ed] on impact assessments of envisaged global climate change";
- 8 percent focused on "mitigation";
- 6 percent focused on methodological questions;
- 8 percent dealt "exclusively with paleo-climatological research unrelated to recent climate change";
- 3 percent "reject[ed] or doubt[ed] the view that human activities are the main drivers of the 'the [sic] observed warming over the last 50 years'";
- 4 percent focused "on natural factors of global climate change"; and
- 42 percent did "not include any direct or indirect link or reference to human activities, CO_2 or greenhouse gas emissions, let alone anthropogenic forcing of recent climate change."[30]

[30]Benny J. Peiser, Letter to *Science*, January 4, 2005, submission ID: 56001. *Science* Associate Letters Editor Etta Kavanagh eventually decided against publishing the letter, or the shortened version of it provided at her request by Peiser, not because it was flawed but because "the basic points of your letter have already been widely dispersed over the internet" (e-mail from Etta Kavanagh to Benny Peiser, April 13, 2005). Peiser, a scientist at Liverpool John Moores University, replied: "As far as I am aware, neither the details nor the results of my analysis have been cited anywhere. In any case, don't you feel that SCIENCE has an obligation to your readers to correct manifest errors? After all, these errors continue to be employed by activists, journalists and science organizations . . . . Are you not aware that most observers know only too well that there is absolutely *no* consensus within the scientific community about global warming science?" He went on to cite a survey of "some 500 climatologists [that] found that 'a quarter of respondents still question whether human activity is responsible for the most recent climatic changes," and other evidence. Peiser, e-mail to Kavanagh, April 14, 2005. The whole correspondence, including much more evidence of the lack of scientific consensus on anthropogenic global warming, is online at www.staff.livjm.ac.uk/spsbpeis/Scienceletter.htm.

On April 6, 2006, sixty well-qualified scientists working in the field of climate change sent an open letter to Canadian Prime Minister Stephen Harper, saying, "Observational evidence does not support today's computer climate models, so there is little reason to trust model predictions of the future." The scientists went on to reject the vision of catastrophic human-induced global warming and oppose the Kyoto Protocol.[31] Shortly afterward a group of leading New Zealand climatologists and meteorologists skeptical of catastrophic human-induced global warming formed The New Zealand Climate Science Coalition.[32] And on April 20, 2006, the British Broadcasting Corporation aired a radio program, "Overselling Climate Change," in which many scientists, including those who believe global warming is a serious problem, decried exaggerated claims about it that undermine confidence in science.[33] As Lindzen testified,

> "Observational evidence does not support today's computer climate models, so there is little reason to trust model predictions of the future."–Sixty climate-change scientists in an open letter to Canadian Prime Minister Stephen Harper

> Indeed, the whole issue of consensus and skeptics is a bit of a red herring. If, as the news media regularly report, global warming is the increase in temperature caused by man's emissions of CO_2 that will give rise to rising sea levels, floods, droughts, weather extremes of all sorts, plagues, species elimination, and so on, then it is safe to say that global warming consists in so many aspects, that widespread agreement on all of them would be suspect *ab initio*. If it truly existed, it would be evidence of a thoroughly debased field. In truth, neither the full text of the IPCC documents nor even the summaries claim any such agreement. Those who insist that the science is settled should be required to state exactly what science they feel is settled.[34]

> ". . . the whole issue of consensus and skeptics is a bit of a red herring. . . . neither the full text of the IPCC documents nor even the summaries claim any such agreement.."–Richard S. Lindzen

The idea of scientific consensus on anthropogenic global warming is an illusion.[35]

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[31] http://www.canada.com/components/print.aspx?id=3711460e-bd5a-475d-a6be-4db87559d605.

[32] http://www.climatescience.org.nz/Index.php. For a news report on it, see http://www.nzherald.co.nz/section/story.cfm?c_id=1&ObjectID=10379768.

[33] "Overselling Climate Change," audio online at http://www.bbc.co.uk/radio4/thebattleforinfluence/pip/abkim/.

[34] "Testimony of Richard S. Lindzen before the Senate Environment and Public Works Committee on 2 May 2001," online at http://epw.senate.gov/107th/lin_0502.htm.

[35] It is ironic that many supporters of the ECI rely heavily on the claim of scientific consensus to buttress their view of global warming. The role of the IPCC in climate studies is similar to that of the Jesus Seminar in New Testament scholarship in the 1990s and Darwinism for the past century. It is a self-selecting group with a narrow point of view favored by the political left and mainstream media, and it tends to respond to critics with derision or dismissal rather than collegial engagement. Evangelicals have been quick to criticize the process behind the Jesus Seminar and Darwinism. They have resisted the idea that complex scholarly issues could be decided by a majority vote among club members. Those same critical instincts need to be kept in place when evaluating claims of consensus on global warming.

Global Warming and Concern for the Poor

The second part of Claim 2 is that "**The consequences of climate change will . . . hit the poor the hardest.**" On the contrary, the destructive impact on the poor of enormous mandatory reductions in fossil fuel use far exceeds the impact on them–negative or positive–of the moderate global warming that is most likely to occur. Indeed, the policy promoted by the ECI would be both economically devastating to the world's poor and ineffective at reducing global warming.

> Full compliance with the Kyoto Protocol's carbon emissions reductions would reduce global warming by less than 0.2° F by 2050–an amount so tiny as to disappear in annual fluctuation and with no significant impact on consequences.

Because energy is an essential component in almost all economic production, reducing its use and driving up its costs will slow economic development, reduce overall productivity, and increase costs of all goods, including the food, clothing, shelter, and other goods most essential to the poor. The ECI does not detail steps to reduce CO_2 emissions, instead offering only broad outlines. That reduces its vulnerability to direct criticism. But its broad outlines generally fit with the Kyoto Protocol, so until the ECI offers its own detailed set of proposals, it is helpful to point out the weaknesses in Kyoto. Compliance with the Protocol, without a global carbon emissions trading mechanism, could cost the global economy about $1 trillion per year[36] (i.e., about 2.25 percent of the world's annual production). Over the fifty years from 2001 to 2050, that means $50 trillion. Yet full compliance would reduce global warming by less than 0.2° F by 2050[37]–an amount so tiny as to disappear in annual fluctuation and with no significant impact on consequences. As a result, its supporters also say Kyoto is just a first step–that we shall need many, perhaps forty, more such treaties,[38] each more costly than the last, to prevent catastrophic global warming. It is

[36]Bjørn Lomborg, "Should we implement the Kyoto Protocol? No–We risk burdening the global community with a cost much higher than that of global warming," at www.spiked-online.com/articles/00000002D2C3.htm. More specifically, with no emissions trading, the combined annual cost of compliance in the year 2010 to the United States, the European Union, Japan, Canada, Australia, and New Zealand alone would be around $350 billion; with emissions trading within two blocks of that group, about $240 billion; with unrestricted trading within all Annex I countries, slightly over $150 billion; and with global trading, about $75 billion. Lomborg, *Skeptical Environmentalist*, 303, Figure 158, citing John P. Weyant and Jennifer N. Hill, "Introduction and overview," *The Energy Journal*, Kyoto Special Issue [1999], vii-xliv, at xxxiii-xxxiv, and Bureau of Economic Analysis, *Price Indexes for Gross Domestic Product and Gross Domestic Purchases* (www.bea.doc.gov/bea/dn/st3.csv) and *Selected NIPA Tables showing advance estimates for the fourth quarter of 2000* (www.bea.doc.gov/bea/dn/dpga.txt), both 2001.

[37]Calculations of the range of temperature reduction from compliance with Kyoto differ but are all very low. E.g.: (1) "the Kyoto Protocol . . ., if adhered to by every signatory (including the United States)[,] would only reduce surface temperature by 0.07° C (.13° F) in fifty years" (Michaels, *Meltdown*, 19). (2) "Global mean reductions [in warming by 2100] for the three scenarios are small, 0.08-0.28°C" [i.e., 0.14-0.5° F] (T. M. L. Wigley, "The Kyoto Protocol: CO2, CH4 and Climate Implications," *Geophysical Research Letters*, vol. 25 [July 1998], 2285-88, at 2287).

[38]Wigley writes: "For B=CONST, the expected global-mean warming to 2100 is reduced by [Kyoto compliance by] 0.10-0.21°C depending on the climate sensitivity (close to 7% in all cases). For NOMORE, the reduction in warming is 4%, while for the B= -1% case it is approximately 14%. The rate of slow-down in temperature rise is small, with no sign of any approach to climate stabilization. *The Protocol, therefore, . . . can be considered only as a first and relatively small step towards stabilizing the climate*" (Wigley, "The Kyoto Protocol," 2287-88, emphasis added). National Center

impossible to calculate with any confidence the actual amount that would cost the world economy, but since initial emissions cuts would be cheapest, and every deeper level of cuts afterward would be more costly, it would stand to reason that compliance with forty levels of Kyoto-type agreements would reduce global economic production not by $1 trillion but by over $40 trillion per year–i.e., about 91 percent of its present total. As Lindzen put it:

> Should a catastrophic scenario prove correct, Kyoto will not prevent it. If we view Kyoto as an insurance policy, it is a policy where the premium appears to exceed the potential damages, and where the coverage extends to only a small fraction of the potential damages. Does anyone really want this? I suspect not.[39]

> The ECI supports a proposal the requirements of which would be far lighter than those of the Kyoto Treaty and consequently would have no significant climatic effect, regardless of cost.

The one specific policy the ECI does name to reduce CO_2 emissions is cap-and-trade: adopting through international treaty maximum limits on global emissions, issuing permits to individual nations, and the nations auctioning those permits to bidders. Specifically, and in contradiction to its explicit concern to reduce global warming and its alleged perils, the ECI supports a proposal by Senators Pete Domenici and Jeff Bingaman the requirements of which would be far lighter than those of the Kyoto Treaty and consequently would have no significant climatic effect, regardless of cost. In principle a tradable permits scheme is a sensible way to deal with pollution and can be less costly than a command-and-control regulatory approach. However, advocating efficient means of achieving pointless goals does not avoid the problem that the goal itself is poorly conceived. Its efficiency depends largely on there being a variety of ways to address the pollution problem at a variety of costs. In the climate change arena, the lowest cost solutions have largely been either abandonment of means of production that are high CO_2 emitters or using "sinks"–planting more forests to absorb CO_2. While the cap-and-trade system for sulfur dioxide emissions ushered in by the Clean Air Act amendments of 1990 is often cited, it operates on a much smaller scale than that envisioned for controlling national and global CO_2 emissions. Sulfur dioxide was controllable with relatively simple and inexpensive end-of-pipe treatments, such as smokestack scrubbers. No such options are available for CO_2 emissions. Imposing an absolute cap on national or global CO_2 emissions in the absence of any low-cost abatement options would create substantial risks of job losses and economic disruption, whether or not permits are tradable.

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for Atmospheric Research scientist Jerry Mahlman says elimination of human-induced warming would require "forty successful Kyotos" (Tim Appenzeller and Dennis Dimick, "The Heat Is On," *National Geographic*, September 2004, 11). David Malakoff cites other climate scientists as saying thirty (David Malakoff, "Thirty Kyotos Needed to Control Warming," *Science*, December 19, 1997, 2048).

[39] "Testimony of Richard S. Lindzen before the Senate Environment and Public Works Committee on 2 May 2001," online at http://epw.senate.gov/107th/lin_0502.htm.

Many scientists, especially agriculturalists, believe that CO_2 should not be classed as a pollutant at all because of its benefits to plant growth.

Moreover, we still must determine how harmful CO_2 emissions are and, thus, the benefits of reducing them. But, as we have seen, many scientists, especially agriculturalists, believe that CO_2 should not be classed as a pollutant at all because of its benefits to plant growth. Even assuming that CO_2 is a pollutant, it is simply impossible at the present state of the science to estimate with any reasonable degree of confidence how much harm–and benefit–is done by each ton emitted, and the balance between the two. Further, most of the proposals for cap-and-trade now on the table would exempt most developing countries from the cap. Because large, rapidly developing countries like India and China are among the exempt, and firms in regulated countries could move operations to unregulated countries to avoid abatement or permit costs, the result would be to leave actual global emissions largely unaffected.

If the aim is to help the poor, what matters from the policy point of view is supporting the development process by which countries acquire greater ability to deal with adverse economic, climatic, and social conditions, regardless of cause.

Church leaders, evangelicals in particular, are concerned about climate change primarily because they fear its potential impacts on the world's poor, especially in the tropics. However, forecasts of things like precipitation and temperature change over long time horizons in particular regions are simply not possible. If the aim is to help the poor, what matters from the policy point of view is supporting the development process by which countries acquire greater ability to deal with adverse economic, climatic, and social conditions, regardless of cause. Put simply, poor countries need income growth, trade liberalization, and secure supplies of reliable, low-cost electricity. Rather than focusing on theoretically possible changes in climate, which varies tremendously anyway with El Niño, La Niña, and other natural cycles, we should emphasize policies–such as affordable and abundant energy–that will help the poor prosper, thus making them less susceptible to the vagaries of weather and other threats in the first place.

ECI's Third and Fourth Assumptions: Reducing CO_2 Emissions

The ECI's **third** and **fourth assumptions** appear under "Claim 3: Christian Moral Convictions Demand Our Response to the Climate Change Problem" and "Claim 4. The need to act now is urgent. Governments, businesses, churches, and individuals all have a role to play in addressing climate change–starting now." The assumptions are that reducing carbon dioxide emissions would so curtail global warming as to significantly reduce its anticipated harmful effects (which we have just seen is false), and that government-mandated carbon dioxide emissions reductions would achieve that end with overall effects that would be more beneficial than harmful to humanity and the rest of the world's inhabitants.

> The harms caused by mandatory CO_2 emissions will almost certaily outweigh the benefits, especially to the poor.

With the general assertions that Christians must care about climate change because we love God and are called to love our neighbors and that God has given us stewardship over the earth, we agree. But these address motive. They do not specify action. The specific actions demanded by the ECI are "to find ways now to begin to reduce the carbon dioxide emissions from the burning of fossil fuels that are the primary cause of human-induced climate change"[40] and to "help the poor adapt to the significant harm that global warming will cause." But as we have already seen, the harms caused by mandatory CO_2 emissions reductions will almost certainly outweigh the benefits, especially to the poor, for whom the marginal increases in prices will be a much greater burden than for the rich.

> Not only will the policies proposed by the ECI not solve any of the real, present, and vast problems that cost millions of deaths among the poor every year, but instead they will slow down and in some cases prevent their being solved.

The world's poor are much better served by enhancing their wealth through economic development than by whatever minute reductions might be achieved in future global warming by reducing CO_2 emissions.[41] It is difficult to imagine how it could possibly be that, as the ECI claims, "*The basic task for all of the world's inhabitants* [emphasis added] is to find ways now to begin to reduce the carbon dioxide emissions from the burning of fossil fuels that are the primary cause of human-induced climate change." Millions of poor people in developing countries die every year because they lack clean water and indoor plumbing, electricity (forcing them to burn wood and dung for cooking and heating and to live without refrigeration and air conditioning), sewage treatment, jobs, access to affordable medical care, and adequate nutrition–not to mention just and orderly legal and economic systems. Not only will the policies proposed by the ECI not solve any of these real, present, and vast problems, but instead they will slow down and in

[40]This question-begging language deserves notice. Suppose (only to illustrate the point, not as if it were true) that one-tenth of 1 percent of global warming were human-induced, and that 60 percent of that were induced by burning fossil fuels. In that case 0.06 percent of global warming would be attributable to burning fossil fuels. If anticipated global warming from a doubling of atmospheric CO_2 were 3° C (likely on the high side), that would mean that only 0.0018° C of global warming from doubled CO_2 could be blamed on burning fossil fuels. Yet it would still be true that only by reducing fossil fuel use could we "reduce the carbon dioxide emissions from the burning of fossil fuels that are the primary cause of *human-induced* climate change."

[41]See, as examples of studies supporting such conclusions, the following papers by environmental policy analyst Indur M. Goklany: "Comments to the Stern Review on the Economics of Climate Change," March 17, 2006, at http://members.cox.net/goklany/Stern%202.pdf; "Evidence for the Stern Review on the Economics of Climate Change," December 9, 2005, http://members.cox.net/goklany/Goklany-%20Evidence%20for%20Stern%20Review.pdf; "Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development," http://members.cox.net/igoklany/Goklany-Integrating_A&M_preprint.pdf; "A Climate Policy for the Short and Medium Term: Stabilization or Adaptation?", *Energy & Environment* 16:3&4 (2005), http://members.cox.net/igoklany/EEv16_Stab_or_Adaptation.pdf; "Evidence to the House of Lords Select Committee on Economic Affairs on Aspects of the Economics of Climate Change," *Energy & Environment* 16:3&4 (2005), http://members.cox.net/igoklany/EEv16-3+4_GoklanyHoL_Evidence.pdf.

some cases prevent their being solved–all for the sake of responding to speculative and likely exaggerated risks far in the future, through measures that would be ineffective anyway.

The ECI's claim that "deadly impacts are being experienced now" is unsubstantiated. To substantiate it, the ECI would have to prove not just that global average temperatures are rising or that severe weather events are more frequent or more extreme, etc., but that (a) these things are significantly driven by CO_2 emissions from fossil fuel consumption and (b) the numbers of deaths attributable to them match or exceed the numbers attributable to the known, well-understood causes listed above. No data anywhere suggest anything remotely like that. In fact, virtually everywhere death rates have declined over the last several decades, even as the globe has admittedly warmed–although they are rising in some areas that are sinking deeper into poverty or where malaria is resurgent and AIDS has become prevalent.[42]

Worse, by emphasizing these improbable risks and solutions, and by condemning the world's poor to slower economic development by raising energy prices, the ECI asks the poor to give up or at least postpone their claims to modern technology that is essential for a better future for themselves and their children. It tells them they must not expect to have fossil fuels, electricity, or even eco-tourism (because jets emit greenhouse gases and cause climate change). Other environmental activists tell them they must not use hydroelectric or nuclear power to generate electricity, because of fears of damming rivers and risks from handling nuclear wastes. So the world's poor must remain indigenous, traditional, and poor–or as Leon Louw has put it, must continue living in "human game preserves," so that affluent Westerners can visit them in their quaint villages.[43]

It is immoral and harmful to Earth's poorest citizens to deny them the benefits of abundant, reliable, affordable electricity and other forms of energy (for homes, cars, airplanes, and factories) merely because it is produced by using fossil fuels. Foreseeable forms of renewable energy (other than hydroelectric) won't provide *reliable, affordable* electricity at least for many years, in amounts that are adequate and necessary for modern hospitals, factories, homes, communities and nations. To tell poor families, communities, and nations that they can't develop hydroelectric or nuclear energy either, because some people disapprove of them, is unconscionable.

It is immoral and harmful to Earth's poorest citizens to deny them the benefits of abundant, reliable, affordable electricity and other forms of energy merely because it is produced by fossil fuels.

As discussed previously, the ECI advises, "In the United States, the most important immediate step that can be taken at the federal level is to pass and implement national legislation requiring sufficient

[42] I. M. Goklany, "The Globalization of Human Well-being," *Policy Analysis* 447 (Washington: Cato Institute, August 22, 2002).

[43] For thorough discussion of the destructive impact of much environmental policy originating in the West on the poor in the developing world, see Paul Driessen, *Eco-Imperialism: Green Power Black Death* (Bellevue, WA: Free Enterprise Press, 2003).

economy-wide reductions in carbon dioxide emissions through cost-effective, market-based mechanisms such as a cap-and-trade program." The term *sufficient* here is misleading: no one claims the kinds of cap-and-trade systems under discussion would be sufficient to mitigate global warming. And the statement itself is a contradiction in terms. Compulsory programs are not market-driven; they are driven by regulations, treaties, and rent seeking.[44] But such programs appeal to politicians, who want to hide the tax and blame others for the soaring prices.

We agree that it is wise to pursue increasing energy efficiency through the development of new technologies. But a program that can only be done by government mandate is by definition not a program that the market deems cost effective. We believe the market is a better judge of cost effectiveness than bureaucrats and politicians. What are needed are *prudent* policies that reflect actual risks, costs, and benefits; an honest evaluation of sound scientific, economic, and technological data; and unbiased application of moral, ethical, and theological principles.

Perhaps the most ironic element of the ECI's "Call to Action" appears in its statement that "as a society and as individuals we must also help the poor adapt to the significant harm that global warming will cause." It is ironic not only because it assumes what might very well be false (that the overall impact of global warming on the poor will be more harmful than beneficial) but, much more importantly, because the cure it prescribes will rob the poor of the very thing they most need if they are to be able to adapt, not just to catastrophic global warming but to *any* future catastrophe: wealth.[45] We know we have said this before, but it bears repeating: since energy is an essential component in all economic production, artificially restricting its consumption will drive down production, drive up prices, and reduce access to life-improving and life-saving technologies, harming the poor especially.

A Better Vision, a Better Call to Action

In light of all the above, we conclude that the best scientific and economic evidence points to these five conclusions:

- Foreseeable global warming will have moderate and mixed (not only harmful but also helpful), not catastrophic, consequences for humanity–including the poor–and the rest of the world's inhabitants.

- Natural causes may account for a large part, perhaps the majority, of the global warming in both the last thirty and the last one hundred fifty years, which together constitute an episode in the natural rising and falling cycles of global average temperature. Human emissions of carbon dioxide and other greenhouse gases are probably a minor and possibly an insignificant

[44]Rent seeking is the process of seeking profit not by producing goods and services for consumers but by manipulating the economic circumstances through government mandates.

[45]I. M. Goklany, "Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation, and Sustainable Development," forthcoming in *Mitigation and Adaptation Strategies for Global Change* (2006).

contributor to its causes.

- Reducing carbon dioxide emissions would have at most an insignificant impact on the quantity and duration of global warming and would not significantly reduce alleged harmful effects.

- Government-mandated carbon dioxide emissions reductions not only would not significantly curtail global warming or reduce its harmful effects but also would cause greater harm than good to humanity–especially the poor–while offering virtually no benefit to the rest of the world's inhabitants.

- In light of all the above, the most prudent response is not to try (almost certainly unsuccessfully and at enormous cost) to prevent or reduce whatever slight warming might really occur. It is instead to prepare to adapt by fostering means that will effectively protect humanity–especially the poor–not only from whatever harms might be anticipated from global warming but also from harms that might be fostered by other types of catastrophes, natural or manmade.

We believe the first four of these points are adequately supported by the previous discussion. Hence we turn to the fifth: the need for economic development to protect against environmental problems of all kinds.

National Center for Atmospheric Research scientist Jerry Mahlman has said even full compliance with Kyoto would have no measurable effect on CO_2 levels or climate–and to stabilize the Earth's climate would take "forty successful Kyotos,"[46] each more restrictive than its predecessors. This assessment and similar ones are behind demands by some that poor countries (especially the large, dynamic ones), which were exempted from the Kyoto Protocol, must also agree to it and curb their appetites for energy. However, Brazil, China, India, and other developing countries have a duty, as governments responsible for the well-being of their people, to promote and facilitate energy and economic development, and greater prosperity and hope, for their people. Poor countries have every right to develop their economies, ultimately creating greater environmental awareness and reaching an improved economic and technological ability to achieve greater energy efficiency, pollution control, and environmental improvement. Similarly, developed nations have a duty to refrain from imposing restrictions that would make it harder for them to do so. Only in this way can both human and ecological goals be met.

Many environmentalists argue that developed and developing nations alike must stop using fossil fuels. They thus oppose coal and natural gas-fired electrical generating plants. But because they also oppose hydroelectric and nuclear facilities, they leave developing countries no alternatives to more expensive, presently less efficient energy technologies like solar and wind (technologies that do not represent the required base load or dependable power source needed by societies for energy security).[47] The very fact that such higher-cost technologies are not widely used in rich countries

[46]Appenzeller and Dimick, "The Heat Is On," *National Geographic*, September 2004, 11.

[47]"Renewable sources of energy–hydroelectric, solar, wind, geothermal and biomass–have high capital investment

testifies that they cannot be widely used in poor ones. Fossil fuels, then, should be seen as a proper stage in energy development, far safer than burning wood and dung (smoke from which claims 1.6 million lives per year),[48] and a means of enabling the economic growth that eventually can make even cleaner technologies affordable.

Stopping or reversing economic development in the world's poor countries–which drastic restrictions on fossil fuel use would cause–would keep poor nations impoverished. It would perpetuate what South Africa's Leon Louw calls "human game preserves" where Western tourists can see "cute indigenous people at one with their environment and the wildlife." But what climate activist–indeed, what signer of "Climate Change: An Evangelical Call to Action"–would willingly, for even a month, live in a mud hut in malaria-infested rural Africa under the indigenous conditions their policy prescription would perpetuate? Who among them would be glad to drink the locals' contaminated water, eat their paltry, mold-infested food, breathe the smoke from their wood and dung fires, live twenty-four hours a day, seven days a week, three hundred sixty-five days a year without lights, air conditioning, and refrigeration? Who among them would work all day in the fields amid swarms of diseased mosquitoes and tsetse flies–and swelter under bed nets, trying to sleep when the temperature in the hut is 90° F and inside the bed net 100°–all without bug spray, pesticides, and anti-malaria pills? Who among them would be prepared to walk twenty miles to the nearest clinic, carrying their sick or dying child with them, when they inevitably come down with the fever, chills, and convulsions of acute malaria?

Stopping or reversing economic development in the world's poor countries–which drastic restrictions on fossil fuel use would cause–would keep poor nations impoverished.

That way of life–or rather, death–is the real, though unintended, impact of the policies promoted by "Climate Change: An Evangelical Call to Action."

A thought experiment might help make our point clearer. Imagine that your city were struck by a

requirements and significant, if usually unacknowledged, environmental consequences. For most renewables, the energy they collect is extremely dilute, requiring large areas of land and masses of collectors to concentrate. Manufacturing solar collectors, pouring concrete for fields of windmills, drowning square miles of land behind dams damages and pollutes." E.g., a 1,000-megawatt wind farm (about the capacity of a medium-sized conventional power plant) would occupy 2,000 square miles "and even with substantial subsidies and uncharged pollution externalities would produce electricity at double or triple the cost of fossil fuels." At that ratio, wind farms sufficient to generate the 604,000 megawatts the United States consumes would occupy a third of the country's total land area. Richard Rhodes and Denis Beller, "The Need for Nuclear Power," *Foreign Affairs* 79:1 (January/February 2000), 30-44; citing here from annotated version at http://www.nci.org/conf/rhodes/index.htm.

[48]The Intermediate Technology Development Group, citing United Nations and International Energy Agency data. Smoke from wood and dung fires thus kills more people than malaria and almost as many as unsafe drinking water and lack of sanitation. Most of its victims are women and children. Alex Kirby, "Indoor smoke 'kills millions'," BBC News, November 28, 2003, online at http://news.bbc.co.uk/go/pr/fr/-/2/hi/science/nature/3244214.stm.

heat wave like the one that killed 700 in Chicago in 1995. Would you be more likely to survive comfortably and safely if you were wealthy, or if you were poor? If the answer is as obvious as we believe it is, what moral basis can there be for adopting an anti-global warming policy that reduces economic development for the world's poor and thus prolongs the time during which they cannot afford to protect themselves from heat–or any other risk?

Responsible discussion of a proposed policy to deal with any problem requires comparing its costs and benefits with those of alternative policies to deal not just with the same problem but also with other problems. Every prescription is likely to have both positive and negative consequences–for different aspects of the environment, different species, different regions, and different groups of people. Therefore we commend the approach used by the Copenhagen Consensus, and we hope our evangelical brothers and sisters, and all who are concerned not just about global warming but about other threats to human and planetary well being, will study it carefully.[49]

We should reduce any emissions only in a cost-effective manner. The difficulty lies in defining what is cost-effective, which entails consideration of monetary cost, available technology, opportunity cost (other uses for that money for health, education, environmental protection, etc), the likelihood and magnitude of risks to be averted, the likelihood and magnitude of benefits to be achieved, who is most likely to enjoy the benefits, who is most likely to bear the costs, and who gets to make the decisions. We believe mandatory carbon emissions reductions are not cost-effective. Therefore we believe that, while we should continue studying the issue, there is no need for draconian measures that will keep the poorest people on Earth from enjoying the benefits of abundant energy. Our technological advancements over the next fifty years will likely dwarf those of the twentieth century and yield new energy generation and use technologies that we cannot even imagine today. All will help reduce human impacts on the climate. More important for the life, health, and well being of the world's poor and their posterity, however, we should continue to promote policies that encourage economic growth where they are.

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[49]Bjørn Lomborg, *Global Crises, Global Solutions* (Cambridge: Cambridge University Press, 2004); http://www.copenhagenconsensus.com/Default.aspx?ID=675. In the process, studies by specialists and respondents were submitted to eight expert economists, including three Nobel Laureates, who then prioritized major problems facing mankind and alternative solutions to them and then ranked them from most to least effective. The alternatives were divided into four categories of cost-effectiveness–Very Good, Good, Fair, and Bad–and listed in descending order of cost effectiveness (how many people would experience how much benefit at what cost) within each category. The results (*Global Crises, Global Solutions*, 606) were: **Very Good**: 1. Communicable diseases: control of HIV/AIDS. 2. Malnutrition and hunger: providing micronutrients. 3. Subsidies and trade: trade liberalization. 4. Communicable diseases: control of malaria. **Good**: 5. Malnutrition and hunger: development of new agricultural technologies. 6. Sanitation and water: community-managed water supply and sanitation. 7. Sanitation and water: small-scale water technology for livelihoods. 8. Sanitation and water: research on water productivity in food production. 9. Governance and corruption: lowering the cost of starting a new business. **Fair**: 10. Migration: lowering barriers to migration for skilled workers. 11. Malnutrition and hunger: improving infant and child nutrition. 12. Communicable diseases: scaled-up basic health services. 13. Malnutrition and hunger: reducing the prevalence of low birth weight. **Bad**: 14. Migration: guest worker programs for the unskilled. 15. Climate change: optimal carbon tax. 16. Climate change: Kyoto Protocol. 17. Climate change: value-at-risk carbon tax. **Of the seventeen options, the three worst all had to do with attempting to reduce global warming.**

Sixteen years ago, the *Oxford Declaration on Christian Faith and Economics* made this crucial point:

> We deplore economic systems based on policies, laws, and regulations whose effect is to favour privileged minorities and to exclude the poor from fully legitimate activities. Such systems are not only inefficient, but are immoral as well in that participating in and benefitting from the formal economy depends on conferred privilege of those who have access and influence to public and private institutions rather than on inventiveness and hard work. Actions need to be taken by public and private institutions to reduce and simplify the requirements and costs of participating in the national economy.[50]

Today we stand with the Oxford Declaration in deploring policies, laws, and regulations whose effect is to favor the already wealthy at the expense of the still poor, excluding them from legitimate development of and legitimate participation in advanced economies and all the benefits they deliver such as lower infant and child mortality rates, longer life expectancy, lower disease rates, more and better education, transportation, communication, and all the other things the already wealthy take for granted. Therefore we pledge to oppose quixotic attempts to reduce global warming. Instead, constrained by the love of Jesus Christ for the least of these (Matthew 25:45), and by the evidence presented above, we vow to teach and act on the truths communicated here for the benefit of all our neighbors.

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[50] *Oxford Declaration on Christian Faith and Economics* (1990), 47; published online at http://www.casi.org.nz/statements/decoxcfe.htm.

Appendix

Signers of the Open Letter to Canadian Prime Minister Stephen Harper

http://www.canada.com/nationalpost/financialpost/story.html?id=3711460e-bd5a-475d-a6be-4db87559d605

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GLOBAL WARMING MAINLY NATURAL AND NOT CATASTROPHIC, SAYS NEW STUDY FROM INTERFAITH STEWARDSHIP ALLIANCE

ISA STUDY WAS RELEASED LAST WEEK IN WASHINGTON, DC

Washington, D.C.; August 2 , 2006 -- While global warming is real, catastrophic, human-induced global warming isn't, and mandatory reductions in fossil fuel use to fight it are unwise, say the authors of "A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming" (http://www.interfaithstewardship.org/calltotruth), released publicly in Washington, D.C., by the Interfaith Stewardship Alliance (ISA) July 25.

The paper is a point-by-point refutation of "Climate Change: A Call to Action," issued in February by the Evangelical Climate Initiative (ECI) (http://www.christiansandclimate.org/statement). Both papers claim support by evangelical leaders, and they rest on the same world view, theology, ethics, and motivation. But the similarities stop there. While the ECI's "Call to Action" asserts that increased atmospheric carbon dioxide because of burning coal, oil, and natural gas causes most of the current warming, the ISA's "Call to Truth" argues that it is probably a minority cause, following changes in energy output from the sun and other natural causes. While the ECI says current global warming is unprecedented, already causing extensive harm, and will become catastrophic, the ISA says it is within the bounds of natural variability, has both harmful and beneficial effects, and is unlikely to become catastrophic. And while the ECI calls for mandatory carbon emissions reductions to reduce future warming, the ISA argues that that policy will harm the world's poor and calls instead for economic development in poor countries to enable them to adapt to whatever climate the future holds.

The contrasts continue. The ECI's "Call to Action" is a brief (about 1,800 words), simple paper that states only broad conclusions, offering little evidence. While the ISA's "Call to Truth" is accompanied by a 1,000-word "Open Letter" that summarizes the conclusions, the paper itself is much longer (about 12,600 words) and includes extensive data, theoretical explanation, and citation of authoritative scientific studies. Because it lacks data, explanation, and sources, the ECI's "Call to Action" implicitly asks readers simply to trust its authors–but it doesn't name any.

The ISA's "Call to Truth" lists four authors, each with special qualifications:

• Roy W. Spencer, Ph.D. (Climatology), principal research scientist, University of Alabama, Huntsville, former senior scientist for climate studies, Marshall Space Flight Center, NASA;
• Ross McKitrick, Ph.D. (environmental economics), associate professor and director of graduate studies, University of Guelph, author of the Donner Prize-winning *Taken By Storm: The Troubled Science, Policy and Politics of Global Warming* (Toronto: Key Porter Books, 2002), and an expert reviewer for the Intergovernmental Panel on Climate Change (Working Group 1);
• Paul K. Driessen, Esq., environmental ethicist, senior policy advisor on energy and environmental issues for the Congress of Racial Equality, and author of *Eco-Imperialism: Green Power, Black Death* (Bellevue, WA: Free Enterprise Press, 2003); and
• E. Calvin Beisner, Ph.D. (history/history of political thought), associate professor of social ethics at Knox Theological Seminary, co-founder of the Interfaith Stewardship Alliance, coauthor of the Cornwall

Declaration on Environmental Stewardship, and author of *Where Garden Meets Wilderness: Evangelical Entry Into the Environmental Debate* (Grand Rapids: Eerdmans/Acton Institute, 1997) and two other books on environmental science and ethics.

The ECI's "Call to Action" was endorsed initially by 86 evangelical leaders–mostly Christian college presidents, mega-church pastors, and mission leaders. Since February it has lost one endorsement but added about ten, none with apparent expertise in climate science, environmental economics, or the economics of climate change adaptation. The ISA's "Call to Truth" is endorsed by 113 evangelical and 19 non-evangelical leaders. Among the evangelical endorsers are 19 environmental scientists, including four climatologists or meteorologists; 13 economists, including four environmental economists; 19 Christian education leaders, including nine chancellors, provosts, or deans of Christian colleges or seminaries; 21 pastors; and 29 theologians. Among its 19 non-evangelical endorsers are 13 environmental scientists, including eight climatologists, meteorologists, and other climate scientists, plus three environmental economists. One evangelical leader so far has revoked his endorsement of the ECI's "Call to Action" and endorsed the ISA's "Call to Truth" instead–Bishop Wellington Boone, founder and chief overseer of the Fellowship of International Churches.

The ECI's "Call to Action" rests on four assumptions:

• Human emissions of carbon dioxide and other greenhouse gases into the atmosphere as we burn fuels for energy are the main cause of global warming.
• Global warming is not only real but is almost certainly going to be catastrophic in its consequences for humanity–especially the poor.
• Reducing carbon dioxide emissions would so curtail global warming as to significantly reduce its anticipated harmful effects.
• Mandatory carbon dioxide emissions reductions would achieve that end with overall effects that would be more beneficial than harmful to humanity and other species.

In contrast, the ISA's "Call to Truth" presents empirical evidence and authoritative sources arguing that:

• Foreseeable global warming will have moderate and mixed (not only harmful but also helpful), not catastrophic, consequences for humanity–including the poor–and other species.
• Natural causes may account for a large part, perhaps the majority, of the global warming in both the last thirty and the last one hundred fifty years, which together constitute an episode in the natural rising and falling cycles of global average temperature. Human emissions of carbon dioxide and other greenhouse gases are probably a minor and possibly an insignificant contributor to its causes.
• Reducing carbon dioxide emissions would have at most an insignificant impact on the quantity and duration of global warming and would not significantly reduce alleged harmful effects.
• Government-mandated carbon dioxide emissions reductions not only would not significantly curtail global warming or reduce its harmful effects but also would cause greater harm than good to humanity–especially the poor–while offering virtually no benefit to other species.
• The most prudent response is not to try to prevent or reduce whatever slight warming might occur. It is instead to prepare to adapt by fostering means that will effectively protect humanity–especially the poor–not only from whatever harms might be anticipated from global warming but also from harms that might be fostered by other types of catastrophes, natural or manmade.

ISA's "Call to Truth" includes evidence refuting ECI's claims that human-induced global warming will cause catastrophic sea level rise; more frequent heat waves, droughts, and extreme weather events such as floods; increased tropical diseases; more intense hurricanes; and reduction in agricultural output. Indeed, it cites conclusive studies showing that rising carbon dioxide enhances plant growth and contributes to increased crop yields, making food more abundant and less expensive, thus helping the world's poor. It

also both refutes the claim of scientific consensus of catastrophic human-induced global warming and argues that such consensus, even if it existed, would not justify failure to test the evidence and arguments in favor of it–and that such testing, in this case, finds the hypothesis unproved.

Two leading climatologists, both expert reviewers for the Intergovernmental Panel on Climate Change, wrote strong commendations of ISA's "Call to Truth" when they endorsed it. MIT's Richard Lindzen wrote, "You and your colleagues have put together one of the best and most cogent statements on this issue that I have seen thus far."

David Legates, associate professor of climatology and director of the Center for Climatic Research at the University of Delaware and Delaware State Climatologist, wrote: "Thank you . . . for allowing me to view . . . *A Call to Truth, Prudence, and Protection of the Poor: An Evangelical Response to Global Warming.* As both a Christian and a scientist, I find the response to be well-written with points well-taken; with Christian brotherly love but noting areas of decided disagreement. I must confess that I have been quite troubled ever since the ECI was unveiled. The climate change debate has become for me very troubling at times but my Christian faith has allowed me to separate the "issues of this world" from those which are far more important. I became extremely discouraged when that debate crossed that line. I am glad to see that you (plural) have put together a well-written essay that lovingly outlays our concerns with the ECI initiative. I trust that the debate in this arena is much more civil–if it is conducted with Christ at the center, it can only remain so. Therefore, as both a Christian and a scientist, I wish to strongly endorse your response to the ECI initiative."

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