

THE KYOTO PROTOCOL: AN UPDATE

HEARING
BEFORE THE
SUBCOMMITTEE ON ASIA, THE PACIFIC, AND
THE GLOBAL ENVIRONMENT
OF THE
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THE KYOTO PROTOCOL: AN UPDATE

WEDNESDAY, JULY 11, 2007

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ASIA, THE PACIFIC,
AND THE GLOBAL ENVIRONMENT,
COMMITTEE ON FOREIGN AFFAIRS,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:03 p.m. in room 2172, Rayburn House Office Building, Hon. Eni F.H. Faleomavaega (chairman of the subcommittee) presiding.

Mr. FALEOMAVAEGA. The committee will come to order. I would like to ask Dr. Watson, as our first witness, to please come to the panel.

The subcommittee is very pleased to hold the hearing this afternoon concerning global environment. And certainly I am very happy that also with us is the distinguished ranking member of our subcommittee, the gentleman from Illinois, Mr. Manzullo; and another senior member of our subcommittee and the full committee as well, my good friend, the gentleman from California, Mr. Rohrabacher.

If I may, I will initiate the hearing by sharing with the witnesses and the audience this afternoon my opening statement. I just want to say we certainly don't have the glare of having Al Gore or other distinguished environmentalists, but one thing I will say is that we have excellent, substantive witnesses who know what they are going to be talking about as far as environmental issues are concerned and as far as it relates to global warming and climate change.

In 1998, the U.S. signed the Kyoto Protocol, the only agreement which establishes legally binding reduction of greenhouse gases, emissions which are major contributors to global warming. However, the Clinton administration did not submit the protocol to the Senate for advice and consent, and in 2001, President Bush rejected the Kyoto Protocol and characterized it as "fatally flawed."

In 2002, the Bush administration announced a U.S. policy for climate change that relies on voluntary actions to reduce greenhouse gas intensity by 18 percent over the next 10 years. But United States withdrawal from the Kyoto Protocol remains a point of controversy, especially with our European allies and other countries of the world. European parties to the protocol continue to press the United States to rejoin the negotiations, particularly on measures to reduce greenhouse gases, after the protocol expires in the year 2012.

While some 169 nations have ratified or accepted the Kyoto Protocol, representing 66 percent of the emissions of developed countries, with obligations outlined in the protocol, parties are reluctant to discuss new commitments beyond the year 2012 if they do not involve all major emitters, including the United States, China and India. This is the challenge before the Ad Hoc Working Group, which was established to begin consideration of next steps and post-Kyoto commitments. The role of the United States is regarded as critical if we are to move forward in addressing the serious issue of climate change now confronting our global community.

In May of this year, President Bush announced that the U.S. would support, and I quote, “an effort to develop a new post-2012 framework on climate change by the end of 2008.” Some suggested that this will undercut Kyoto Protocol’s negotiations.

Today, we have three outstanding witnesses who will testify before the subcommittee and to begin to address the following issues. And several of the questions that I want to raise, aside from the Asia-Pacific Partnership for Clean Development and Climate, and given that the United States has neither ratified nor withdrawn from the Kyoto Protocol, what is the administration doing to advance international cooperation on climate change? Given that the protocol lapses in the year 2012, what measures should the United States, as the largest emitter of carbon dioxide, take to slow growth in greenhouse emissions? What is preventing our U.S. industries from setting up markets for buying and selling emission credits? Given that more than 400 U.S. cities support and adhere to the Kyoto Protocol, what is being done at the Federal level to accelerate the development of technology that can be used to reduce gas emissions? And given that 70 percent of greenhouse gas emissions come from the production and consumption of energy, what should the United States be doing to encourage its energy sector to provide people with clean energy while reducing greenhouse emissions? What policy suggestions should the United States make at the 2000 summit to make the Kyoto Protocol more effective in slowing the pace of global warming and to make it more equitable among U.S. and other developed nations? And given that the U.S. is not a signator to the Kyoto Protocol, what influence does it have, if any, to promote global action?

I welcome as our first witness this afternoon a gentleman with a very distinguished record, Dr. Harlan Watson. Dr. Harlan Watson is the Senior Climate Negotiator and Special Representative at the United States Department of State. In this capacity, he serves as alternate head of the U.S. delegations to sessions of the Conference of the Parties to the United Nations Framework Convention on Climate Change and heads U.S. delegations to meetings of the Subsidiary Bodies of the UNFCCC and the Intergovernmental Panel on Climate Change. Dr. Watson also heads the National Security Council Policy Coordination Committee Working Group on Climate Change.

Dr. Watson joined the Department of State’s Bureau of Oceans and International Environmental and Scientific Affairs in September 2001. He previously served for more than 16 years on the U.S. House of Representatives Committee on Science, including

over 6½ years as staff director of the committee's Subcommittee on Energy and the Subcommittee on Energy and Environment.

Dr. Watson's further career is involved as senior advisor to the Secretary of the Interior and as Principal Deputy and Deputy Assistant Secretary of the Department of the Interior for Water and Science. He was a professional staff member of the U.S. Senate Committee on Governmental Affairs. He worked as a technical staff for the TRW, Incorporated; received his bachelor's degree in physics from the Western Illinois University, and his doctorate, also in physics, from Iowa State University, and a master's in economics from Georgetown University.

[The prepared statement of Mr. Faleomavaega follows:]

PREPARED STATEMENT OF THE HONORABLE ENI F.H. FALEOMAVAEGA, A REPRESENTATIVE IN CONGRESS FROM AMERICAN SAMOA, AND CHAIRMAN, SUBCOMMITTEE ON ASIA, THE PACIFIC, AND THE GLOBAL ENVIRONMENT

In 1998, the US signed the Kyoto Protocol, the only agreement which establishes legally binding reductions of greenhouse gas (GHG) emissions, which are major contributors to global warming. However, the Clinton Administration did not submit the Protocol to the Senate for advice and consent. In 2001, President Bush rejected the Kyoto Protocol and characterized it as "fatally flawed."

In 2002, the Bush Administration announced a US policy for climate change that relies on voluntary actions to reduce greenhouse gas intensity by 18% over the next ten years. But US withdrawal from the Kyoto Protocol remains a point of controversy with our European allies. European parties to the Protocol continue to press the United States to rejoin the negotiations particularly on measures to reduce GHG after the Protocol expires in 2012.

While some 169 nations have ratified or accepted the Kyoto Protocol, representing 66% of the emissions of developed countries with obligations outlined in the Protocol, parties are reluctant to discuss new commitments beyond 2012 if they do not involve all major emitters including US, China, and India. This is the challenge before the Ad hoc Working Group which was established to begin consideration of next steps and post-Kyoto commitments.

The role of the US is regarded as critical if we are to move forward in addressing the serious issue of climate change now confronting the global community. In May of this year, President Bush announced that the US would support "an effort to develop a new Post-2012 framework on climate change by the end of 2008." Some suggest that this will undercut Kyoto Protocol negotiations.

Today, we have three witnesses who will testify before the Subcommittee on Asia, the Pacific, and the Global Environment and begin to address the following: Aside from the Asia Pacific Partnership for Clean Development and Climate and given that the US has neither ratified nor withdrawn from the Kyoto Protocol, what is the Administration doing to advance international cooperation on climate change; given that the Protocol lapses in 2012, what measures should the US, as the largest emitter of carbon dioxide, take to slow growth in greenhouse emissions; what is preventing our US industries from setting up markets for buying and selling emission credits; given that more than 400 US cities support and adhere to the Kyoto Protocol, what is being done at the federal level to accelerate the development of technology that can be used to reduce emissions; given that 70 percent of greenhouse gas emissions come from the production and consumption of energy, what should the US be doing to encourage its energy sector to provide people with clean energy while reducing greenhouse emissions; what policy suggestions could the US make at the 2007 Summit to make the Kyoto Protocol more effective in slowing the pace of global warming and to make it more equitable among US and other developed nations; and given that the US is not a signatory to the Kyoto Protocol, what influence does it have, if any, to promote global action?

I welcome our witnesses including Dr. Harlan L. Watson, Senior Climate Negotiator and Special Representative at the US Department of State, Bureau of Oceans and International Environmental and Scientific Affairs. In this capacity, he serves as alternate head of the U.S. delegations to sessions of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) and heads U.S. delegations to meetings of the Subsidiary Bodies to the UNFCCC and the Intergovernmental Panel on Climate Change (IPCC). Dr. Watson also heads the

National Security Council Policy Coordination Committee (NSC/PCC) Working Group on Climate Change.

Also with us is Elliot Diring, Director of International Strategies at the Pew Center on Global Climate Change. Mr. Diring oversees the Center's analysis of the international challenges posed by climate change and strategies for meeting them, and directs the Center's outreach to key governments and actors involved in international climate change negotiations. Mr. Diring came to the Pew Center from the White House, where he was Deputy Assistant to the President and Deputy Press Secretary. In this capacity, he served as a principal spokesman for President Clinton and advised senior White House staff on press and communications strategy. He previously served as Senior Policy Advisor and as Director of Communications at the Council on Environmental Quality, where he helped develop major policy initiatives, led White House press and communications strategy on the environment, and was a member of U.S. delegations to climate change negotiations.

Finally, Dr. Margo Margo Thorning is managing director of the Brussels-based International Council for Capital Formation. She writes and lectures on tax and economic policy and has made presentations on the economic impact of climate change policy and the Asia Pacific Partnership on Clean Development and Climate at forums organized by the ICCF in China, India other Asian countries as well as in the European Parliament in Brussels, and in London, Berlin, Washington and Australia. Previously, Dr. Thorning served at the U.S. Department of Energy, the U.S. Department of Commerce, and the Federal Trade Commission.

I welcome our witnesses and look forward to their statements.

Mr. FALEOMAVAEGA. Before requesting Dr. Watson for his testimony, I would like to give this opportunity for our ranking member for his opening statement.

Mr. MANZULLO. Mr. Chairman, thank you for holding this important hearing on the Kyoto Protocol and climate change. I noted that school is in the State of Illinois from which you graduated. It is a great State.

I am delighted that the subcommittee will finally have a chance to examine the record of the Kyoto Protocol and to discuss the real economic costs of unilateral carbon emissions schemes. My colleagues recall that 2 months ago, the Majority rushed through markup a large and expensive climate change bill called the International Climate Cooperation Reengagement Act, without the benefit of hearing from our expert witnesses. I offered an amendment to H.R. 2420 that retained the focus of the underlying bill, while saving the American taxpayer close to \$2 billion. Unfortunately, my amendment failed; however, I hope Dr. Watson, our distinguished Senior Climate Negotiator, will comment on H.R. 2420.

The underlying costs behind Kyoto and other unilateral carbon schemes are conveniently forgotten in the current debate. My colleagues need to be reminded of the fact that cap-and-trade schemes, carbon taxes, and other unilateral caps pose real consequences and practical problems for the American people and their livelihoods. Without the active cooperation from the world's largest polluters, such as China, India, Brazil, any scheme we devise will do nothing to limit overall climate change; however, it will erode our competitiveness against Chinese, Indian, and Brazilian firms because they will not be burdened by the costs of compliance. This is something the American people need to know. So I simply do not understand how the Majority could propose such actions at a time when we already have a record trade deficit.

America's small manufacturers and businesses are the backbone of our economy. One needs to look no further than Illinois' 16th Congressional District, which I have the honor to represent, to see the potential devastating side of poorly thought out climate change

policies. Any energy-intensive business, from manufacturing automobiles to foundries, will bear a heavy burden.

The congressional district I represent is a microcosm of the American economy, with over 2,500 manufacturers, an intense agricultural sector, a thriving service economy, and a booming population in McHenry County suburbs. In the 1980s, Rockford, Illinois, led the Nation in unemployment at 25 percent. During the last recession, key cities in northern Illinois, such as Rockford and Freeport, experienced the double-digit unemployment primarily because of the downturn in the manufacturing sector, which also had ripple effects into other segments of the regional economy. The northern Illinois area is turning the corner on manufacturing, even though we are still down several thousand manufacturing jobs and unemployment is less than 6 percent. Nevertheless, we must not pursue a course that will further undermine hard-working Americans and turn over more business opportunities to our foreign competitors in the developing world.

My purpose is not to argue the merits of climate change, but to point out that a third approach is needed to really tackle the issue. Given the profound economic costs of mitigation efforts and the divisiveness of the debate, it is our duty to try an approach the American people can coalesce around. I advocate that we address climate change as a part of a greater effort to tackle global pollution, of which greenhouse gases are a part.

The Asia-Pacific Partnership for Clean Development and Climate is a step in the right direction that Kyoto lacks. The mere fact that China and India are participating in this initiative speaks volumes about the success of Kyoto. If this partnership empowers the people of China and India to engage in clean development, then it will reduce the amount of toxic pollution that is currently being released into the environment. Each day 1,000 automobiles are added to the streets in Beijing. A thousand a day. One can only envision, Mr. Chairman, the continued pollution that will be coming from that country.

Mr. Chairman, I look forward to hearing from our witnesses, and I thank you for this very insightful hearing.

[The prepared statement of Mr. Manzullo follows:]

PREPARED STATEMENT OF THE HONORABLE DONALD A. MANZULLO, A
REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. Chairman, thank you for holding this important hearing on the Kyoto Protocol and climate change. I thank all of the witnesses for participating today.

I am delighted that this Subcommittee will finally have a chance to examine the record of the Kyoto Protocol and to discuss the real economic cost of unilateral carbon emission schemes. My colleagues will recall that two months ago the majority rushed through markup a large and expensive climate change bill called the International Climate Cooperation Reengagement Act without the benefit of hearing from our expert witnesses. I offered an amendment to H.R. 2420 that retained the focus of the underlying bill while saving the American taxpayer close to \$2 billion. Unfortunately my amendment failed. However, I hope Dr. Watson, our distinguished Senior Climate Negotiator, will comment on H.R. 2420.

The real economic costs behind Kyoto and other unilateral carbon reduction schemes are conveniently forgotten in the current debate. While the majority focuses on satisfying one of their constituent groups, let me remind my colleagues that cap-and-trade schemes, carbon taxes, and other unilateral caps pose real consequences and practical problems for the American people and their livelihoods. Without the active cooperation from the world's largest polluters such as China, India, and Brazil, any scheme we devise will do nothing to limit overall climate change. How-

ever, it will erode our competitiveness against Chinese, Indian, and Brazilian firms because they will not be burdened by the cost of compliance. This is something the American people need to know. So, I simply do not understand how we can propose such actions at a time when we already have a record trade deficit.

Mr. Chairman, America's small manufacturers and businesses are the backbone of our economy. One needs to look no further than Illinois' 16th Congressional District, which I have the honor to represent, to see the potential devastating side effects of poorly thought out climate change policy. Any energy intensive business, from manufacturing automobiles to foundries, will bear a heavy burden. The 16th District is a microcosm of the American economy with approximately 2,500 manufacturers, an intense agricultural sector, and a thriving service economy. In the 1980s, the 16th District led the nation in unemployment at 25 percent. During the last recession, key cities in northern Illinois such as Rockford and Freeport experienced double-digit unemployment primarily because of the downturn in the manufacturing sector, which also had ripple effects into other segments of the regional economy. Now, I am proud to say that northern Illinois has recently turned the corner and unemployment is less than 6 percent in Rockford. Nevertheless, we must not pursue a course that will further undermine hard working Americans and turn over more business opportunities to our foreign competitors in the developing world.

My purpose is not to argue the merits of climate change but to point out that a third approach is needed to really tackle this issue. Given the profound economic cost of mitigation efforts and the divisiveness of the debate, it is our duty to try an approach that the American people can coalesce around. I advocate that we address climate change as part of a greater effort to tackle global pollution, which greenhouse gas emissions are a part.

The Asia-Pacific Partnership for Clean Development and Climate is a step in the right direction that Kyoto lacks. The mere fact that China and India are participating in this initiative speaks volumes about the success of Kyoto. If this Partnership empowers the people of China and India to engage in clean development, then it will help reduce the amount of toxic pollution that is currently being released into the environment. If we make a concerted effort to limit all types of toxic pollution through practical technological solutions, then we will be making a real difference in climate changes and in addressing real near-term threats to our health.

Thank you Mr. Chairman. I look forward to hearing from our witnesses today.

Mr. FALEOMAVAEGA. I thank the gentleman for his statement.

I also want to note and I think 39 percent of greenhouse gases is coming out of China compared to the rest of the world, higher even than our own country, from what I understand.

At this time I would like to recognize the gentleman from New Jersey for his opening statement.

Mr. SIRES. Thank you, Mr. Chairman, but I will hold until I get to ask him questions.

Mr. FALEOMAVAEGA. Thank you.

I now turn the time to my good friend, the gentleman from California, who not only is a senior member of our House Science Committee, but also is a former chairman of one of our science subcommittees. Mr. Rohrabacher.

Mr. ROHRABACHER. Thank you, Mr. Chairman. And as a senior member of the Science Committee, and a member of the International Relations Committee, I guess Foreign Affairs Committee now, I have had the advantage of both receiving expert testimony from witnesses in terms of our relations with other countries and other governments concerning this issue, as well as being able to receive the testimony of very respected scientists on the issue of global warming and climate change.

I will be submitting for the record, Mr. Chairman, a list of quotes from very respected scientists from around the world who believe that the whole global warming debate is fallacious and is being manipulated by scientists basically in order to get government grants, research grants. And I will be submitting all of these for the record.

Mr. FALCOMA. Without objection.

Mr. ROHRBACHER. And just for just a little bit of preview, Timothy Ball, chairman of the Natural Resources Stewardship Project for a Victoria-based environmental consultancy, former climatology professor at the University of Winnipeg, says, "Believe it or not, Global Warming is not due to human contribution of Carbon Dioxide (CO₂). This in fact is the greatest deception in the history of science. We are wasting time, energy and trillions of dollars while creating unnecessary fear and consternation over an issue with no scientific justification."

Furthermore, you have got Richard Lindzen, a professor of meteorology at the Massachusetts Institute of Technology (MIT), who stated, ". . . only the most senior scientists today can stand up against this alarmist gale, and defy the iron triangle of climate scientists, advocates and policymakers." He, too, thinks that this is way overdone, and, in fact, unnecessarily alarmist.

Even more significantly, perhaps, we have a report from Dr. Christopher Landsea, which goes directly, perhaps, to some of the issues that we will be discussing today, which are dealing with the Intergovernmental Panel on Climate Change, from which Dr. Landsea withdrew after being involved in the process, saying, "I personally cannot in good faith continue to contribute to a process that I view as being both motivated by pre-conceived agendas and being scientifically unsound." Now, this is a fellow that ran NOAA's Oceanographic and Meteorological Laboratory.

Finally, and just recently, just the last 2 days, a man who testified before the Science Committee while I was there supporting the global warming theory now states in terms of what the IPCC came up with, there is no estimate, even probabilistic, as to the likelihood of any emissions scenario, and no best guess. None of the models used by the IPCC are initialized to the observed state, and none of the climate states in the models correspond even remotely to the current observed climate. In particular, the state of the oceans, sea ice, and soil moisture has no relationship to the observed state at any recent time in any of the IPCC models. Now, this and the rest of his statement reflect the fact that there is not a scientific certainty.

In fact, there are many people who believe that what we are being presented is scaremongering at its worst. I, over my last 30 years, have gone through this type of thing before. A lot of people don't remember these scares. I remember when it was global cooling that everybody was afraid of. In fact, many of the people who are now trying to frighten us into heavy regulation and out of billions of dollars of revenue were advocates of global cooling as being the problem.

Then, of course, there was the acid rain scare. How many people remember that now? That was a huge issue in the mid-1980s. It was just—just as many scientists were up being quoted about how horrible an impact that was going to have. But that has totally disappeared now. Why? Because it has been evident through all of the scientific research that has happened since the mid-1980s that the acid rain scare was nothing but a scare and didn't have sound scientific basis for us to be molding public policy that will result in

the expenditure of tens, if not hundreds of billions of dollars that should be going in another direction.

Now, obviously we are in a period of time where there is climate change that is taking place. This has happened in cycle after cycle in the Earth's history and has not been caused by tailpipe emissions of SUVs or any other energy source. It has been caused, in these past cycles, by something else. And what has caused the cycles in the past is the same thing that causes the cycle of climate change on Mars and Jupiter today, as well as on the world, and that is sun and solar activity, sunspots and solar activity.

Mr. Chairman, I hope that we have the courage to stand up and say that the king has no clothes. But if we continue to develop policies based on something that has no scientific basis, that is being used in order to get government contracts for research, but are not valid, we are doing a great disservice to the people of this country, to the children whose resources are being squandered, who should be going for education.

Let us just note, and finally, Mr. Chairman, there is a parallel for those of us who are concerned about air quality. Because I believe that global warming is a myth in the sense that it is man-caused global warming does not mean that those of us who believe that do not believe that we should not have control over pollution that is going into our air. But we should be focusing our efforts on that air pollution that affects human health so that our children will live better and healthier lives, so the people of China that we were just talking about do not end up dying at a young age and have all sorts of diseases, not focused on CO2 and other types of emissions that have no impact on people's health.

So with that said, I am looking forward to hearing the testimony today. I consider this a controversial issue, and not something that we always hear about, well, the issue is over and done with.

I will submit these quotes from major scientists from around the world calling global warming into question for the record. Thank you very much.

[The information referred to follows:]

QUOTES ON CLIMATE CHANGE

Bold is added in quotes to emphasize a point

DISTORTED SCIENCE

Richard Lindzen

Bio

Dr. Richard Lindzen is an atmospheric physicist, the Alfred P. Sloan Professor of Meteorology at MIT and a member of the National Academy of Science. Lindzen is known for his research in dynamic meteorology—especially atmospheric waves.

Quote

“Alarm rather than genuine scientific curiosity, it appears, is essential to maintaining funding. And **only the most senior scientists today can** stand up against this alarmist gale, and **defy the iron triangle of climate scientists, advocates and policymakers.**”

From a Wall Street Journal op ed
April 12, 2006; Page A14

See <http://www.opinionjournal.com/extra/?id=110008220>

Global warming debate is more politics than science, according to climate expert

Written By: Dr. Richard Lindzen

Published In: Environment News

Publication Date: November 1, 2004

Publisher: The Heartland Institute

Quote:

No regulatory solution to the “problem” of preventing increases in CO₂ is available, but the ubiquity of CO₂ emissions—which are associated with industry and life itself—remains a tempting

Petr Chylek

Bio

Dr. Petr Chylek is a member of the technical staff at Space and Remote Sensing Sciences, Los Alamos National Laboratory and an Adjunct professor of Physics and Atmospheric Science, Dalhousie University, Halifax and New Mexico State University. He received his, Ph. D., Physics University of California, Riverside, California in 1970 Dr. Chylek is a Optical Society of America: Fellow and a member of the American Meteorological Society.

Quote

“**Scientists who want to attract attention to themselves, who want to attract great funding to themselves, have to (find a) way to scare the public . . .** and this you can achieve only by making things bigger and more dangerous than they really are,” said Petr Chylek, professor of physics and atmospheric science at Dalhousie University, Halifax, Nova Scotia.

Patrick Michaels

Bio

Dr. Patrick Michaels is a senior fellow at the Cato Institute and a research professor of environmental sciences at the University of Virginia. He is a past president of the American Association of State Climatologists and was program chair for the Committee on Applied Climatology of the American Meteorological Society.

Quote

“The notion that we must do ‘something in 10 years’ repeated by a small but vocal band of extremists, enjoys virtually no support in the truly peer reviewed scientific literature,” says Patrick J. **Michaels**, research professor of environmental studies at the University of Virginia.

R.A. Pielke Jr

Bio

Roger Pielke, Jr. serves as director of the Center for Science and Technology Policy Research. He has been on the faculty of the University of Colorado since 2001 and is a professor in the Environmental Studies Program and a fellow of the Cooperative Institute for Research in the Environmental Sciences (CIRES).

Quote

“**. . . no connection has been established between greenhouse gas emissions and the observed behavior of hurricanes,**” according to R.A. Pielke Jr., writing in the Bulletin of American Meteorological Society.

Dr. Mitchell Taylor

Bio

Dr. Mitchell Taylor, Polar Bear Biologist, Department of the Environment, Government of Nunavut, Igloolik, Nunavut

Quote

“**Of 13 populations of polar bears in Canada, 11 are stable or increasing in number.** They are not going extinct, or even appear to be affected at present,”

Dr. Richard Tol**Bio**

Richard Tol holds an M.Sc. (1992, Econometrics) and a Ph.D. (1997, Economics) from the Vrije Universiteit in Amsterdam.

He is known for his work on impacts of, and adaptation to climate change. He developed the Climate Framework for Uncertainty, Negotiation and Distribution, an integrated assessment model for climate change. He participates in the model comparison exercises of the Energy Modeling Forum of Stanford University.

He is an author (contributing, lead, principal and convening) of Working Groups I, II and III of the Intergovernmental Panel on Climate Change. He is an author and editor of the UNEP Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies.

Quote

"If a student of mine were to hand in this report as a master's thesis, perhaps if I were in a good mood I would give him a D for diligence; but more likely I would give him an F for fail."

Dr. Bjorn Lomborg**Bio**

Dr. Lomborg is adjunct professor at the Copenhagen Business School, and author of the best-selling "The Skeptical Environmentalist," where he challenges our understanding of the environment, and points out how we need to focus our attention on the most important problems first. In May 2004 he organized the "Copenhagen Consensus" which brought together some of the world's top economists. Here they prioritized the best opportunities to the world's big challenges.

Quote

"Its fear-mongering arguments have been sensationalized, which is ultimately only likely to make the world worse off."

Dr. William Happer Jr.**Bio**

In 1991 William Happer was appointed by President George Bush to be Director of Energy Research in the Department of Energy and served until 1993. On his return to Princeton, he was named Eugene Higgins Professor of Physics and Chair of the University Research Board. Dr. Happer is a Fellow of the American Physical Society, the American Association for the Advancement of Science, and a member of the American Academy of Arts and Sciences, the National Academy of Sciences and the American Philosophical Society.

Happer, director of energy research at the U.S. Department of Energy for two years, was asked to leave. "I was told that science was not going to intrude on policy he says."

"With regard to global climate issues, we are experiencing politically correct science," Happer says. "Many atmospheric scientists are afraid for their funding, which is why they don't challenge Al Gore and his colleagues. They have a pretty clear idea of what the answer they're supposed to get is. The attitude in the administration is, 'If you get a wrong result, we don't want to hear about it.'"

See <http://www.sepp.org/Archive/contro/controversies/happer.html>

... Bush appointee William Happer, the highly regarded director of research at the Department of Energy, was slated to stay on board after the 1992 election. But Happer, in internal discussions and congressional testimony, continued to discount global-warming alarmism and push for additional research before taking draconian action. One former Energy employee remembers a meeting where a high-ranking civil servant told Happer, "I agree with you, Will, but I'd like to keep my job." Happer got the axe.

From an article in *National Review* October 14 1996

See http://www.findarticles.com/p/articles/mi_m1282/is_n19_v48/ai_18763610/pg_3

Dr. Christopher Landsea**Bio**

Christopher Landsea, formerly a research meteorologist with Hurricane Research Division of Atlantic Oceanographic & Meteorological Laboratory at NOAA, is now the Science and Operations Officer at the National Hurricane Center. He is a member of the American Geophysical Union and the American Meteorological Society. He earned his doctoral degree in Atmospheric Science at Colorado State University.

Dr. Landsea wrote an open letter withdrawing from the IPCC because of politicalization of his work on the committee. The first and last paragraphs of that letter are below. For the complete letter see <http://www.lavoisier.com.au/papers/articles/landsea.html>

“Dear colleagues,

After some prolonged deliberation, I have decided to withdraw from participating in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). I am withdrawing because I have come to view the part of the IPCC to which my expertise is relevant as having become politicized. In addition, when I have raised my concerns to the IPCC leadership, their response was simply to dismiss my concerns.”

I personally cannot in good faith continue to contribute to a process that I view as both being motivated by pre-conceived agendas and being scientifically unsound. As the IPCC leadership has seen no wrong in Dr. Trenberth’s actions and have retained him as a Lead Author for the AR4, I have decided to no longer participate in the IPCC AR4.

Sincerely,

CHRIS LANDSEA
17 January 2005

William Gray**Bio**

Dr. William M. Gray is a world famous hurricane expert and emeritus Professor of Atmospheric Science, Colorado State University

“So many people have a vested interest in this global-warming thing-all these big labs and research and stuff. **The idea is to frighten the public, to get money to study it more.**”

From an article in Discover, vol. 26 no. 9, September 2005

See <http://discovermagazine.com/2005/sep/discover-dialogue/>

“Researchers pound the global warming drum because they know there is politics, and money behind it.”

Dr. Hendrik (Henk) Tennekes**Bio**

Hendrik (Henk) Tennekes is formerly director of research at the Royal Dutch Meteorological Institute and a professor of aeronautical engineering at Penn State. Tennekes pioneered methods of multi-modal forecasting.

In an article posted on the Science & Environmental Policy Project web site (Jan 2006) he said:

“I protest against overwhelming pressure to adhere to the climate change dogma promoted by the adherents of IPCCThe advantages of accepting a dogma or paradigm are only too clear One no longer has to query the foundations of one’s convictions, one enjoys the many advantages of belonging to a group that enjoys political power, one can participate in the benefits that the group provides, and one can delegate questions of responsibility and accountability to the leadership. In brief, the moment one accepts a dogma, one stops being an independent scientist.”

See <http://www.sepp.org>

 UNDUE PRESSURE AND INFLUENCE
Dr. William Gray**Bio**

William M. Gray is a world famous hurricane expert and emeritus Professor of Atmospheric Science, Colorado State University.

From an interview with Dr. William M. Gray
in Discover Magazine, September 2005
Title: "Weather Seer: 'We're Lucky'"

"Are your funding problems due in part to your views?"

"G: I can't be sure, but I think that's a lot of the reason. I have been around 50 years, so my views on this are well known. I had NOAA money for 30 some years, and then when the Clinton administration came in and **Gore started directing some of the environmental stuff, I was cut off. I couldn't get any NOAA money.** They turned down 13 straight proposals from me."

Dr. Roger Revelle/Dr. Fred Singer**Bio**

Roger Revelle was a leader in the field of oceanography. Revelle trained as a geologist at Pomona College and at U.C. Berkeley. Then, in 1936, he received his Ph.D. in oceanography from the Scripps Institution of Oceanography. Revelle was a member of the National Academy of Sciences (NAS) and served as a member of the Ocean Studies Board, the Board on Atmospheric Sciences and Climate, and many committees. Dr. Revelle passed away in 1991.

See http://dels.nas.edu/osb/about_revelle.shtml

Bio

S. Fred Singer, an atmospheric physicist, is professor emeritus of environmental sciences at the University of Virginia, adjunct scholar at the National Center for Policy Analysis, and former director of the U.S. Weather Satellite Service. He is also a research fellow at the Independent Institute and author of Hot Talk, Cold Science: Global Warming's Unfinished Debate (The Independent Institute, 1997)

Al Gore refers to Dr. Revelle in his film *An Inconvenient Truth* and his book *Earth in the Balance*. He cites Dr. Revelle as a person who influenced his views regarding the dangers of global warming.

But an article, co-authored by Revelle in the April 1991 issue of *Cosmos* magazine, and later reprinted in the New Republic, states: "The scientific base for a greenhouse warming is too uncertain to justify drastic action at this time," and "[t]he bright light of political environmentalism [Gore], seems increasingly to believe that the only correct stance is to press the panic button on every issue."

A dispute ensued regarding whether Dr. Revelle's name should be shown as co-author of the *Cosmos* article which was being subsequently being placed in an anthology on climate change by Dr. Richard Geyer.

According to Dr. Fred Singer, on July 20 1992, in a telephone conversation between Singer (a co-author of the article) and Dr. Julian Lancaster (a former associate of Revelle) Lancaster requested that Revelle's name be removed.

"When I refused his request, Dr. Lancaster stepped up the pressure on me. . . . he suggested that Dr. Revelle had not really been a coauthor and made the ludicrous claim that I had put his name on the paper as a coauthor 'over his objections.'"

"Subsequently, Dr. Anthony D. Socci, a member of Senator Gore's staff, made similar outrageous accusations in a lengthy letter to the publishers of the Geyer volume, requesting that the *Cosmos* article be dropped," according to Singer.

See http://www.findarticles.com/p/articles/mi_m1282/is_n12_v46/ai_15544248
http://media.hoover.org/documents/0817939326_283.pdf

Also:

Jonathan Adler in the *Washington Times* on July 27, 1994:

"Concurrent with Mr. Lancaster's attack on Mr. Singer, Mr. Gore himself led a similar effort to discredit the respected scientist. Mr. Gore reportedly contacted 60

Minutes and Nightline to do stories on Mr. Singer and other opponents of Mr. Gore's environmental policies. The stories were designed to undermine the opposition by suggesting that only raving ideologues and corporate mouthpieces could challenge Mr. Gore's green gospel. The strategy backfired. When Nightline did the story, it exposed the vice president's machinations and compared his activities to Lysenkoism: The Stalinist politicization of science in the former Soviet Union."

Nightline 2/24/94 Ted Koppel:

"There is some irony in the fact that Vice President Gore, one of the most scientifically literate men to sit in the White House in this century, that he is resorting to political means to achieve what should ultimately be resolved on a purely scientific basis."

Richard Lindzen

Bio

Richard Lindzen is an atmospheric physicist, the Alfred P. Sloan Professor of Meteorology at MIT and a member of the National Academy of Science. Lindzen is known for his research in dynamic meteorology—especially atmospheric waves.

Quote

"In Europe, Henk Tennekes was dismissed as research director of the Royal Dutch Meteorological Society after questioning the scientific underpinnings of global warming."

From a Wall Street Journal op ed
April 12, 2006; Page A14

See <http://www.opinionjournal.com/extra/?id=110008220>

KYOTO

Patrick Michaels

Bio

Dr. Patrick Michaels is a senior fellow at the Cato Institute and a research professor of environmental sciences at the University of Virginia. He is a past president of the American Association of State Climatologists and was program chair for the Committee on Applied Climatology of the American Meteorological Society.

Quote

"The journal *Geophysical Research Letters* estimated in 1997 that if every nation on Earth lived up to the United Nations' Kyoto Protocol on global warming, it would prevent no more than 0.126 degrees F of warming every 50 years. Global temperature varies by more than that from year to year, so that's not even enough to measure. **Climatically, Kyoto would do nothing.**"

Quote from an article "*Live With Climate Change*" by Pat Michaels in USA Today on February 2, 2007

See http://www.cato.org/pub_display.php?pub_id=7502

Jerry Taylor and Peter Van Doren

Bios

Jerry Taylor is a senior fellow at the Cato Institute where he researches environmental policy. Dr. Peter Van Doren is editor of Regulation magazine and a senior fellow at the Cato Institute.

Quote

"Signatories to the Kyoto Protocol are finding that their low cost, free lunch compliance strategies are yielding squat. The United Nations reported late last month that greenhouse gas **emissions from countries that promised emissions reductions under the Kyoto Protocol increased by 4.1 percent** from 2000 to 2004 (the most recent year for which we have reliable data). **U.S. emissions, by contrast, were up only 1.3 percent over that same period.**"

Quotes from the article “*The Public Won’t Pay for Global Warming Legislation*” by Jerry Taylor and Peter Van Doren in the Tampa Tribune on January 31, 2007

See http://www.cato.org/pub_display.php?pub_id=7545

Fred Singer

Bio

S. Fred Singer, an atmospheric physicist, is professor emeritus of environmental sciences at the University of Virginia, adjunct scholar at the National Center for Policy Analysis, and former director of the U.S. Weather Satellite Service. He is also a research fellow at the Independent Institute and author of Hot Talk, Cold Science: Global Warming’s Unfinished Debate (The Independent Institute, 1997)

Quote

“There is no dispute at all about the fact that even if punctiliously observed, [the Kyoto Protocol] would have an imperceptible effect on future temperatures—one twentieth of a degree by 2050,” Singer observes.

COST

Patrick Michaels

Bio

Dr. Patrick Michaels is a senior fellow at the Cato Institute and a research professor of environmental sciences at the University of Virginia. He is a past president of the American Association of State Climatologists and was program chair for the Committee on Applied Climatology of the American Meteorological Society.

Quote

“The stark reality is that if we really want to alter the warming trajectory of the planet significantly, we have to cut emissions by an extremely large amount, and—a truth that everyone must know—we simply do not have the technology to do so. **We would fritter away billions** in precious investment capital in a futile attempt to curtail warming”

Quote from an article “Live With Climate Change” by Pat Michaels in *USA Today* on February 2, 2007

See http://www.cato.org/pub_display.php?pub_id=7502

Jerry Taylor and Peter Van Doren

Bios

Jerry Taylor is a senior fellow at the Cato Institute where he researches environmental policy. Dr. Peter Van Doren is editor of Regulation magazine and a senior fellow at the Cato Institute.

“The direct **costs** associated with greenhouse gas emission controls **include avoidable deaths** in the developing world. The United Nations, for example, reports that about 2 million people on this planet die every year because they don’t have electricity and must burn biomass for heating and cooking. This results in greatly elevated levels of indoor air pollutants and premature deaths. Increasing the cost of electricity—an unavoidable consequence of ridding the global economy of the fossil fuels that generate greenhouse gases—will slow our ability to conquer this problem.”

“**Putting a stop to global warming** would require Herculean social and economic change, and the economic costs associated with those changes **are steep—an annual \$1,154 per household in the United States**, according to the recently released Stern Review.”

Quotes from an article “*Global Warming Insurance is a Bad Buy*” by Jerry Taylor and Peter Van Doren in National Review (Online), November 20, 2006.

See http://www.cato.org/pub_display.php?pub_id=6780

Fred Singer**Bio**

Dr Fred Singer is an atmospheric physicist and professor emeritus of environmental sciences at the University of Virginia, adjunct scholar at the National Center for Policy Analysis, and former director of the U.S. Weather Satellite Service. He is also a research fellow at the Independent Institute.

Quote

“Crucially, greenhouse models cannot explain the observed patterns of warming—temperature trends at different latitudes and altitudes. These data, published in a U.S. government scientific report in May 2006, lead us to conclude that the human contribution is not significant. Most of current warming must therefore stem from natural causes. It may well be part of an unstoppable solar-driven 1,500-year cycle of warming and cooling that’s been documented in ice cores, ocean sediments, stalagmites, and so forth—going back a million years.

“If indeed most of current warming is natural rather than from greenhouse gases, there is little point in reducing carbon-dioxide emissions. Further, carbon dioxide is not an atmospheric pollutant. **Programs and policies for carbon dioxide control should therefore be scrapped**—including uneconomic alternative energy sources, carbon-sequestration efforts, and costly emission-trading schemes. All of these waste money and squander scarce resources, without in any way affecting the atmosphere or climate. Humans have adapted to major climate changes in the past, and we should have no problem doing so in the future.”

Quote from an article “*No Evidence For Human-Caused Global Warming*” by Fred Singer Published in the New York Sun, Feb. 2, 2007

See <http://www.sepp.org/Archive/weekwas/2007/February%203.htm>

Timothy Ball**Bio**

Dr. Tim Ball, Chairman of the Natural Resources Stewardship Project (www.nrsp.com), is a Victoria-based environmental consultant and former climatology professor at the University of Winnipeg.

Quote

Quote From an article “*Global Warming: The Cold, Hard Facts?*” by Timothy Ball in The Canadian Free Press (online) Monday, February 5, 2007

See <http://www.canadafreepress.com/2007/global-warming020507.htm>

Believe it or not, Global Warming is not due to human contribution of Carbon Dioxide (CO₂). This in fact is the greatest deception in the history of science. We are wasting time, energy and trillions of dollars while creating unnecessary fear and consternation over an issue with no scientific justification. For example, Environment Canada brags about spending \$3.7 billion in the last five years dealing with *climate change* almost all on propaganda trying to defend an indefensible scientific position while at the same time closing weather stations and failing to meet legislated pollution targets.

No sensible person seeks conflict, especially with governments, but if we don’t pursue the truth, we are lost as individuals and as a society. That is why I insist on saying that there is no evidence that we are, or could ever cause global climate change. And, recently, Yuri A. Izrael, Vice President of the United Nations sponsored Intergovernmental Panel on Climate Change (IPCC) confirmed this statement. So how has the world come to believe that something is wrong

SEA LEVEL CHANGE

Patrick Michaels**Bio**

Dr. Patrick Michaels is a senior fellow at the Cato Institute and a research professor of environmental sciences at the University of Virginia. He is a past president of the American Association of State Climatologists and was program chair for the Committee on Applied Climatology of the American Meteorological Society.

Quote

“As measured recently by satellite, and published in Science magazine, Greenland is losing .0004% of its ice per year, or 0.4% per century. All modern computer models require nearly **1000 years** of carbon concentrations three times what they are today **to melt the majority of Greenland’s ice**. Does anyone seriously believe we will be a fossil-fuel powered society in, say, the year 2500?”

“A small but very vocal band of extremists have been hawking a doomsday scenario, in which Greenland suddenly melts, raising sea levels 12 feet or more by 2100.” “. . . it is repeated everywhere, and its supporters are already claiming that the IPCC” “. . . “is now **wrong because it has toned down its projections of doom and gloom**”.

Quotes from an article “*Global Warming: So What Else Is New?*” by Pat Michaels in the San Francisco Chronicle on February 2nd, 2007.

See www.cato.org/pubdisplay.php/pub__id=7543

 IPCC CLIMATE MODELS
Christopher Horner**Bio**

Christopher C. Horner serves as a Senior Fellow at xxxCEI, in which capacity he oversees petitions and litigation on topics including data access and quality laws, the Freedom of Information Act, and government science and agency statutory compliance, and other legal matters involving environment and energy issues, international environmental treaties, and climate policy. He is the author of “The Politically Incorrect Guide to Global Warming and Environmentalism” (Regnery, 2007). A practicing attorney in Washington, D.C., Mr. Horner works on a legal and policy level with numerous think tanks and policy organizations throughout the world.

“. . . the dirtiest secret of all regarding climate models: When we attempt to test thwm, they fail miserably

Politically Incorrect Guide to Global warming

Patrick Michaels**Bio**

Dr. Patrick Michaels is a senior fellow at the Cato Institute and a research professor of environmental sciences at the University of Virginia. He is a past president of the American Association of State Climatologists and was program chair for the Committee on Applied Climatology of the American Meteorological Society.

Quote

“It is scientific malpractice to use them,” observes University of Virginia environmental sciences research professor Patrick Michaels. “I choose my words carefully here. If a physician prescribed medication that demonstrably did not work, he would lose his license.”

Fred Singer**Bio**

Dr Fred Singer is an atmospheric physicist and professor emeritus of environmental sciences at the University of Virginia, adjunct scholar at the National Center for Policy Analysis, and former director of the U.S. Weather Satellite Service. He is also a research fellow at the Independent Institute.

Quote

“The models have erroneously predicted a 20th century surge in the Earth’s temperatures to match surging CO2 concentrations in the atmosphere. It hasn’t happened.”

Richard Lindzen

As the primary “consensus” document, the Scientific Assessment of the UN’s Intergovernmental Panel on Climate Change notes, modellers at the United Kingdom’s Hadley Centre had to cancel two-thirds of the model warming in order to simulate the observed warming.

So the warming alarm is based on models that overestimate the observed warming by a factor of three or more, and have to cancel most of the warming in order to match observations.

The temperature is as likely to go down as up

By Richard Lindzen, *Sunday Telegraph*

Last Updated: 1:39am GMT 30/10/2006

<http://www.telegraph.co.uk/news/main.jhtml?xml=/news/2006/10/29/nclimate129.xml>

Kevin Trenberth

The IPCC instead proffers “what if” projections of future climate that correspond to certain emissions scenarios. There are a number of assumptions that go into these emissions scenarios. They are intended to cover a range of possible self-consistent “story lines” that then provide decision makers with information about which paths might be more desirable.

But they do not consider many things like the recovery of the ozone layer, for instance, or observed trends in forcing agents. There is no estimate, even probabilistically, as to the likelihood of any emissions scenario and no best guess.

None of the models used by IPCC are initialized to the observed state and none of the climate states in the models correspond even remotely to the current observed climate. In particular, the state of the oceans, sea ice, and soil moisture has no relationship to the observed state at any recent time in any of the IPCC models.

Dr. Kevin E. Trenberth is Head of the Climate Analysis Section at the National Center for Atmospheric Research. He has published over 400 scientific articles or papers, including 40 books or book chapters, and over 175 refereed journal articles and has given many invited scientific talks as well as appearing in a number of television, radio programs and newspaper articles. He is listed among the top 20 authors in highest citations in all of geophysics.

Temperature change vs. CO2 change

The Politics of Global Warming

Very good interview with climatologist

Dr. Timothy Ball in the *Pittsburgh Tribune-Review*.

http://iceagenow.com/Climatologist_Dr_Timothy_Ball.htm

Quote

... in the theory the claim is that if CO2 goes up, temperature will go up. The ice core record of the last 420,000 years shows exactly the opposite. It shows that the temperature changes before the CO2. So the fundamental assumption of the theory is wrong. That means the theory is wrong.

Ken Calderia

Geoengineering—A quick fix with big risks

http://www.eurekalert.org/pub_releases/2007-06/ci-gaq060107.phpQuote

“Geoengineering schemes have been proposed as a cheap fix that could let us have our cake and eat it, too. But geoengineering schemes are not well understood. Our study shows that planet-sized geoengineering means planet-sized risks.”

Ken Caldeira is a scientist at the Carnegie Institution’s department of global ecology.

Bios

Dr. Timothy Ball, Chairman of the Natural Resources Stewardship Project (www.nrsp.com), is a Victoria-based environmental consultant and former climatology professor at the University of Winnipeg.

Dr. Petr Chylek is a member of the technical staff at Space and Remote Sensing Sciences, Los Alamos National Laboratory and an Adjunct professor of Physics and

Atmospheric Science, Dalhousie University, Halifax and New Mexico State University

He received his, Ph. D., Physics University of California, Riverside, California in 1970 Dr. Chylek is a Optical Society of America: Fellow and a member of the American Meteorological Society.

Dr. William M. Gray is a world famous hurricane expert and emeritus Professor of Atmospheric Science, Colorado State University.

In 1991 **William Happer** was appointed by President George Bush to be Director of Energy Research in the Department of Energy and served until 1993. On his return to Princeton, he was named Eugene Higgins Professor of Physics and Chair of the University Research Board. Dr. Happer is a Fellow of the American Physical Society, the American Association for the Advancement of Science, and a member of the American Academy of Arts and Sciences, the National Academy of Sciences and the American Philosophical Society.

Dr Simon Iain Hay is a member of congregation of the University and a Senior Research Fellow in the Department of Zoology. His most recent research is focused at defining more accurately human populations at risk of malaria at global, regional and national levels. Dr Hay is a series editor for *Advances in Parasitology* and has contributed to over 90 *research papers*.

Christopher Landsea, formerly a research meteorologist with Hurricane Research Division of Atlantic Oceanographic & Meteorological Laboratory at NOAA, is now the Science and Operations Officer at the National Hurricane Center. He is a member of the American Geophysical Union and the American Meteorological Society. He earned his doctoral degree in Atmospheric Science at Colorado State University.

Dr. Richard Lindzen is an atmospheric physicist, the Alfred P. Sloan Professor of Meteorology at MIT and a member of the National Academy of Science Lindzen is known for his research in dynamic meteorology—especially atmospheric waves.

Dr. Lomborg is adjunct professor at the Copenhagen Business School, and author of the best-selling “The Skeptical Environmentalist,” where he challenges our understanding of the environment, and points out how we need to focus our attention on the most important problems first. In May 2004 he organized the “Copenhagen Consensus” which brought together some of the world’s top economists. Here they prioritized the best opportunities to the world’s big challenges

Dr. Patick Michaels is a senior fellow at the Cato Institute and a research professor of environmental sciences at the University of Virginia. He is a past president of the American Association of State Climatologists and was program chair for the Committee on Applied Climatology of the American Meteorological Society.

Roger Pielke, Jr. serves as director of the Center for Science and Technology Policy Research. He has been on the faculty of the University of Colorado since 2001 and is a professor in the Environmental Studies Program and a fellow of the Cooperative Institute for Research in the Environmental Sciences (CIRES).

Roger Revelle (deceased) was a leader in the field of oceanography. Revelle trained as a geologist at Pomona College and at U.C. Berkeley. Then, in 1936, he received his Ph.D. in oceanography from the Scripps Institution of Oceanography. Revelle was a member of the National Academy of Sciences (NAS) and served as a member of the Ocean Studies Board, the Board on Atmospheric Sciences and Climate, and many committees. Dr. Revelle passed away in 1991. See http://dels.nas.edu/osb/about_revelle.shtml

Dr Fred Singer, an atmospheric physicist, is professor emeritus of environmental sciences at the University of Virginia, adjunct scholar at the National Center for Policy Analysis, and former director of the U.S. Weather Satellite Service. He is also a research fellow at the Independent Institute.

Jerry Taylor is a senior fellow at the Cato Institute where he researches environmental policy.

Dr. Mitchell Taylor, *Polar Bear Biologist, Department of the Environment, Government of Nunavut, Igloolik, Nunavut*

Hendrik (Henk) Tennekes is formerly director of research at the Royal Dutch Meteorological Institute and a professor of aeronautical engineering at Penn State. Tennekes pioneered methods of multi-modal forecasting.

Richard Tol holds an M.Sc. (1992, Econometrics) and a Ph.D. (1997, Economics) from the Vrije Universiteit in Amsterdam. He is known for his work on impacts of,

and adaptation to climate change. He developed the *Climate Framework for Uncertainty, Negotiation and Distribution*, an integrated assessment model for climate change. He participates in the model comparison exercises of the Energy Modeling Forum of Stanford University.

He is an author (contributing, lead, principal and convening) of Working Groups I, II and III of the *Intergovernmental Panel on Climate Change*. He is an author and editor of the UNEP Handbook on Methods for Climate Change Impact Assessment and Adaptation Strategies.

Dr. Peter Van Doren is editor of *Regulation* magazine and a senior fellow at the Cato Institute

Mr. FALEOMAVEGA. I thank my good friend for his statement. And this is what the debate is all about. As I recall, my good friend, I think it was last year, I am not much of a poet, but he did say that global warming was nothing but global baloney. I don't know if that rhymes very much on that.

Mr. ROHRBACHER. Warm baloney.

Mr. FALEOMAVEGA. Warm baloney, not global baloney. And I think I will say to the gentleman the debate continues. And I think it is quite reflected also by the fact that the administration is taking an entirely different approach in addressing the issue of climate or global warming, if you will, in terms of the actions that the administration had taken with what happened to the Kyoto Protocol, and that is why we are here having this hearing. I don't know if any other committee has actually called a hearing specifically to address the status of where we are now since the implementation of the Kyoto Protocol among some of the 169 nations, with the exception, of course, of the United States and I believe Australia are the only two countries that are not signers to the Kyoto Protocol.

I thank the gentleman from California.

I would now like to turn the time over to Dr. Watson for his testimony. Thank you.

STATEMENT OF HARLAN WATSON, PH.D., SPECIAL REPRESENTATIVE AND SENIOR CLIMATE NEGOTIATOR, BUREAU OF OCEANS AND INTERNATIONAL ENVIRONMENT AND SCIENTIFIC AFFAIRS, U.S. DEPARTMENT OF STATE

Mr. WATSON. Thank you, Mr. Chairman and members of the subcommittee. And thank you for the opportunity to appear before you today. With your permission, I have a longer statement to submit for the record, and will focus my oral remarks on the international components of the administration's approach to climate change.

Mr. FALEOMAVEGA. Without objection.

Mr. WATSON. Thank you.

President Bush has reaffirmed America's commitment to the United Nations Framework Convention on Climate Change on numerous occasions. He has also made clear that he would not commit the United States to the Kyoto Protocol, which would have imposed major costs on our economy, and is ineffective in even addressing climate change because it does exclude developing nations.

Given the issue's complexity and its interlinkages with virtually all aspects of human activity, there is now a broad international consensus that climate change cannot be dealt with in a vacuum. Rather, it needs to be addressed as part of an integrated agenda that promotes economic growth, reduces poverty, provides access to

modern sanitation and clean water, enhances agricultural productivity, provides energy security, reduces traditional air pollution, and mitigates greenhouse gases.

Meeting these multiple objectives will require a sustained, long-term commitment by all nations. To this end, the President has established a robust and flexible climate change policy that harnesses the power of markets and technology, maintains economic growth, and encourages global participation. The President has requested, and Congress has provided since 2001, nearly \$37 billion for climate change science and observations, technology, international assistance, and incentive programs, more than any other nation by far. And the President's fiscal year 2008 budget requests nearly \$7.4 billion for climate-related activities.

The administration also believes that well-designed, multilateral collaborations focused on achieving practical results can accelerate development and commercialization of new clean-energy technologies and advance climate change science. Under President Bush's leadership, the U.S. has brought together nations to tackle jointly some tough clean-energy and science challenges. Attachment 1 to my written testimony highlights some of the various partnerships we have.

We are engaging now some 79 nations and the European Union in these activities, and these do include the Asia-Pacific Partnership on Clean Development and Climate, the Carbon Sequestration Leadership Forum, the Group on Earth Observations, two nuclear multilateral partnerships, the Generation IV International Forum and the Global Nuclear Energy Partnership, the International Partnership for a Hydrogen Economy, and the Methane to Markets Partnership, and our 15 bilateral and regional partnerships.

Most recently, on May 31st, the President announced that the United States would work with other nations to establish a new framework on greenhouse gas emissions when the Kyoto Protocol expires in 2012. Under his proposal, America and other nations will set a long-term global goal for reducing greenhouse gas emissions by the end of 2008. We will, the United States will, convene a series of meetings with nations that produce the most emissions. We want each country to establish midterm national targets and programs that reflect their own mix of energy sources and future energy needs, and also create a strong and transparent monitoring system so that we can measure each country's performance.

He has also proposed that nations bring together industry leaders from different sectors of our economy, such as power generation, transportation, alternative fuels, and so on, to form working groups that would cooperate on ways to share clean-energy technology and best practices, as well as strengthening climate change initiatives within the convention itself that benefit all countries, such as adaptation to climate change, deforestation and technology.

The G-8 leaders in Heiligendamm in June largely endorsed the President's initiative and agreed to a process for concluding by the end of 2008 a comprehensive post-Kyoto framework that does include major countries, and would contribute to global agreement under the convention in 2009.

Mr. Chairman and members of the subcommittee, I hope my testimony this afternoon, particularly my written testimony, conveys

the sense of the vast extent and breadth to which the United States is working to address global climate change. And I would be pleased to answer any of your questions. Thank you.

[The prepared statement of Mr. Watson follows:]



Testimony of

Dr. Harlan L. Watson
Senior Climate Negotiator and Special Representative
U.S. Department of State

Before the
Committee on Foreign Affairs
Subcommittee on Asia, the Pacific, and the Global Environment
United States House of Representatives

Hearing on:
“The Kyoto Protocol: An Update”

July 11, 2007

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**Written Statement of
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**Before the
Committee on Foreign Affairs
Subcommittee on Asia, the Pacific, and the Global Environment
United States House of Representatives**

**Hearing on:
“The Kyoto Protocol: An Update”**

July 11, 2007

Mr. Chairman and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss our efforts to address climate change.

1. Introduction

I would like to begin my testimony by providing a brief overview of the Administration’s approach to climate change. I will then address the international and domestic components of that approach.

As a party to the United Nations Framework Convention on Climate Change (UNFCCC), the United States shares with the other 190 Parties to the Convention its ultimate objective as stated in the Convention’s Article 2¹: “to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.” This objective is qualified by stating that it “should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.” In February 2002, President Bush reaffirmed America’s commitment to the Framework Convention and to its ultimate objective.²

Given the complexity of the issue and its interlinkages with virtually all aspects of human activity, there is a broad international consensus that climate change cannot be dealt with in a vacuum.³ Rather, it needs to be addressed as part of an integrated agenda that promotes

¹See <http://unfccc.int/resource/docs/convkp/conveng.pdf>, p. 4.

²See <http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html>.

³See, for example, the 2005 G8 Gleneagles Communiqué on Africa, Climate Change, Energy and Sustainable Development at <http://www.g8.utoronto.ca/summit/2005gleneagles/communique.pdf>, and the Gleneagles Plan of Action: Climate Change, Clean Energy and Sustainable Development at <http://www.g8.utoronto.ca/summit/2005gleneagles/climatechangeplan.pdf>.

economic growth, reduces poverty, provides access to modern sanitation and clean water, enhances agricultural productivity, provides energy security, reduces pollution, *and* mitigates greenhouse gas emissions.

Meeting these multiple objectives will require a sustained, long-term commitment by all nations over many generations. To this end, the President has established a robust and flexible climate change policy that harnesses the power of markets and technological innovation, maintains economic growth, and encourages global participation.

Major elements of this approach include: (1) promoting international cooperation, (2) implementing near-term policies and measures to slow the growth in greenhouse gas emissions; (3) advancing climate change science; (4) accelerating technology development and deployment;

The President has requested, and Congress has provided, substantial funding for climate change science and observations, technology, international assistance, and incentive programs—approximately \$37 billion since 2001, more than any other nation. The President's fiscal year 2008 budget requests nearly \$7.4 billion for climate-related activities.

2. Promoting international cooperation

President Bush has repeatedly highlighted the importance of international cooperation in developing an effective and efficient global response to the complex and long-term challenge of climate change.⁴

Any effective international response to climate change requires both developed- and developing-country participation, which includes both near-term efforts to slow the growth in emissions and longer-term efforts to build capacity for future cooperation. The Administration also believes that well-designed multilateral collaborations focused on achieving practical results can accelerate development and commercialization of new technologies and advance climate change science.

New International Framework: On May 31, 2007, the President called upon the world's major economies, both from the developed and developing world, to work together to develop a global goal on long-term greenhouse gas reductions.⁵ This new international global strategy recognizes that the major emerging economies must develop and participate in an effective global strategy, and that economic growth, energy security and climate change must be addressed in an integrated way. The United States will host the first of a series of meetings with other countries—including rapidly growing economies like India and China—to establish a new framework for the post-2012 world. Progress towards a global emissions reduction goal will be underpinned by midterm national targets and programs that are tailored towards each participant's current and future energy needs, and that will be subject to a robust review process. In addition, participants will work on sectoral approaches to energy intensive industries and

⁴See <http://www.whitehouse.gov/news/releases/2001/06/20010611-2.html>, <http://www.whitehouse.gov/news/releases/2002/02/20020214-5.html>, and <http://www.whitehouse.gov/news/releases/2007/05/20070531-9.html>.

⁵See <http://www.whitehouse.gov/news/releases/2007/05/20070531-9.html>.

concrete steps to promote the development and deployment of clean energy technologies. The President believes that by encouraging and sharing cutting-edge technologies, the major economies will build the capacity to meet realistic reduction goals.

As part of his international initiative, the President also proposed strengthening climate-related initiatives at the UN that benefit all countries, including adaptation to climate change, deforestation and technology. Finally, the President's initiative addresses practical action necessary to advance the global development and deployment of clean energy technologies. This could include low-cost capital sources to finance investment in clean energy, mechanisms to share government-developed technology at low cost, or in some cases, no cost at all, and elimination of market barriers.

At the G8 summit in Heiligendamm, Germany in June, the leaders largely endorsed the President's initiative. Specifically, the G8 leaders agreed to a process for concluding by the end of 2008 a comprehensive post-Kyoto framework that includes all the major energy consuming and greenhouse gas emitting countries and that could contribute to a global agreement under the UNFCCC in 2009, and they welcomed the U.S. offer to host a meeting of the major economies this fall. The lengthy G8 declaration called for concrete action on many of specifics of the President's proposal and is consistent with the core approach President Bush has stressed throughout his presidency—that our efforts on climate change must be integrated within a broader context that includes energy security and development.

Under President Bush's leadership, the United States has brought together key nations to tackle jointly some tough energy and science challenges. These multilateral collaborations—including the Asia-Pacific Partnership on Clean Development and Climate (APP), the Carbon Sequestration Leadership Forum (CSLF), the Group on Earth Observations (GEO), the Generation IV International Forum (GIF), the Global Nuclear Energy Partnership (GNEP), the International Partnership for a Hydrogen Economy (IPHE), the Methane to Markets Partnership (M2M)—and our 15 bilateral and regional partnerships involve 79 nations and the European Union (see Attachment I). They also mirror the main strategic thrusts of our domestic research programs, while addressing complementary concerns, such as energy security, climate change, and environmental stewardship.

Asia-Pacific Partnership on Clean Development and Climate (APP)⁶: The Asia-Pacific Partnership for Clean Development and Climate (APP), launched in January 2006 by ministers from Australia, China, India, Japan, Republic of Korea, and the United States, is one of our most consequential multilateral initiatives. It is a multi-stakeholder partnership working to generate practical and innovative projects promoting clean development and the mitigation of greenhouse gases. Through engaging private industry as well as government officials, the APP is using public-private partnerships to build local capacity, improve efficiency and reduce greenhouse gas emissions, create new investment opportunities, and remove barriers to the introduction of clean energy technologies in the Asia-Pacific region. What makes the approach unique is that APP activities are identified and supported using an innovative “bottom up” approach. Together, APP partner countries account for about half of the world's population, economic output, energy use, and greenhouse gas emissions.

⁶See <http://www.asiapacificpartnership.org/> and <http://www.state.gov/g/oes/climate/app/>.

The APP has created eight task forces to achieve the Partnership's goals: (1) cleaner fossil energy; (2) renewable energy and distributed generation; (3) power generation and transmission; (4) steel; (5) aluminum; (6) cement; (7) coal mining; and (8) buildings and appliances. The Task Forces, with representatives from both the public and private sectors, have each prepared an Action Plan and identified an initial tranche of 98 projects that are in the implementation stage. The President's fiscal year 2008 budget request includes \$52 million to support APP.

Carbon Sequestration Leadership Forum (CSLF)⁷: CSLF is a U.S.-launched initiative that was established formally at a ministerial meeting held in Washington, DC, in June 2003. The Forum is focused on the development of improved cost-effective technologies for the separation and capture of carbon dioxide (CO₂) for its transport and long-term safe storage. Its purpose is to make these technologies broadly available internationally, to identify and address wider issues relating to carbon capture and storage. CSLF, which includes 21 countries and the European Commission, has endorsed 19 international research projects, 13 of which involve the United States, and approved a technology roadmap to provide future directions for international cooperation.

Group on Earth Observations (GEO)⁸: Of particular importance is the need for a broad global observation system to support measurements of climate and other environmental variables. On July 31, 2003, the United States hosted 33 nations including many developing nations at the inaugural Earth Observation Summit, out of which came a commitment to establish GEO and an intergovernmental, comprehensive, coordinated, and sustained Global Earth Observation System of Systems (GEOSS). While the use and benefits of these observations are extensive, the climate applications of the data collected by the system include the use of the data to create better climate models, to improve our knowledge of the behavior of CO₂ and aerosols in the atmosphere, and to develop strategies for carbon sequestration. The United States was instrumental in drafting a ten-year implementation plan for a GEOSS, which was approved by nearly 60 nations and the European Commission at the 3rd Earth Observation Summit in Brussels in February 2005. The United States also released its contribution through the Strategic Plan for the U.S. Integrated Earth Observing System in April 2005 to help coordinate a wide range of environmental monitoring platforms, resources, and networks.⁹

Generation IV International Forum (GIF)¹⁰: GIF, formally established in July 2001, is a multilateral collaboration comprised of 10 countries and EURATOM (the European Atomic

⁷See <http://www.cslforum.org/> and <http://www.fe.doe.gov/programs/sequestration/cslf/>. CSLF members are the United States, Australia, Brazil, Canada, China, Colombia, Denmark, European Commission, France, Germany, Greece, India, Italy, Japan, Mexico, Netherlands, Norway, Republic of Korea, Russian Federation, Saudi Arabia, South Africa, and the United Kingdom.

⁸GEO has 70 countries and the European Commission as Members, as well 46 as Participating Organizations in GEO (see <http://earthobservations.org/>).

⁹See http://usgeo.gov/docs/EOCStrategic_Plan.pdf.

¹⁰See <http://www.ne.doe.gov/genIV/neGenIV2.html>. GIF member countries include the United States, Argentina, Brazil, Canada, France, Japan, Republic of Korea, South Africa, Switzerland, and the United Kingdom. In July 2006, the GIF voted unanimously to extend offers of membership to China and Russia. These two countries officially signed the GIF Charter in November 2006 at the Policy Group meeting in Paris and have one year to sign the Framework to become full members.

Energy Community) to fulfill the objective of the Generation IV Nuclear Energy Systems Initiative. GIF's goal is to develop the fourth generation of advanced, economical, safe, and proliferation-resistant nuclear systems that can be adopted commercially no later than 2030. Six technologies have been selected as the most promising candidates for future designs, some of which could be commercially ready in the 2020 to 2030 timeframe. GIF countries are jointly preparing a collaborative research program to develop and demonstrate the projects.

Global Nuclear Energy Partnership (GNEP)¹¹: GNEP is a groundbreaking new effort that seeks to develop a worldwide consensus on enabling expanded use of economical, carbon-free nuclear energy to meet growing electricity demand. It has two major goals: (1) to expand carbon-free nuclear energy to meet growing electricity demand worldwide; and (2) to promote non-proliferation objectives through the leasing of nuclear fuel to countries which agree to forgo enrichment and reprocessing. A more fully closed fuel cycle model envisioned by this partnership requires development and deployment of technologies that enable recycling and consumption of long-lived radioactive waste. The GNEP initiative proposes international partnerships and significant cost-sharing to achieve these goals. On May 21, 2007, U.S. Department of Energy (DOE) and senior energy officials from China, France, Japan, and Russia issued a joint statement in support of GNEP.¹²

International Partnership for the Hydrogen Economy (IPHE)¹³: Recognizing the common interest in hydrogen research that many countries share, the United States called for an international hydrogen partnership in April 2003, and in November 2003, representatives from 16 governments gathered in Washington to launch IPHE. The Partnership's 16 countries and the European Commission (EC) are working together to advance research, development, and deployment of hydrogen and fuel-cell technologies, and develop common codes and standards for hydrogen use. The IPHE Steering Committee has officially recognized 23 collaborative projects to advance the Partnership's goals, and through the IPHE, the U.S. has assisted Brazil and China in developing hydrogen roadmaps.

Methane to Markets Partnership¹⁴: In November 2004, the United States and representatives from 13 countries launched the Methane to Markets Partnership, which is led on the U.S. side by EPA, with active participation from the U.S. Department of Agriculture (USDA), U.S. Agency for International Development (USAID), U.S. Trade and Development Agency (TDA), and the State Department. This Partnership, now with 20 member countries and over 550 public and private sector organizations, focuses on advancing cost-effective, near-term methane recovery and use as a clean energy source to enhance economic growth, promote energy security, improve the environment, and reduce greenhouse gases. The Partnership is targeting four major methane sources: landfills, underground coal mines, natural gas and oil systems, and agriculture (animal

¹¹ See <http://www.gnep.energy.gov/>.

¹² See http://www.energy.gov/media/GNEP_Joint_Statement.pdf.

¹³ See <http://www.iphe.net/>. IPHE Partner members are the United States, Australia, Brazil, Canada, China, European Commission, France, Germany, Iceland, India, Italy, Japan, New Zealand, Norway, Republic of Korea, Russian Federation, and the United Kingdom.

¹⁴ See <http://www.epa.gov/methanetomarkets/> and <http://www.methanetomarkets.org/>. Methane to Markets member governments include the United States, Argentina, Australia, Brazil, Canada, China, Colombia, Ecuador, Germany, India, Italy, Japan, Mexico, Nigeria, Poland, Republic of Korea, Russian Federation, Ukraine, the United Kingdom, and Vietnam.

waste management). The Partnership has the potential to deliver by 2015 annual reductions in methane emissions of up to 50 MMTCE or recovery of 500 billion cubic feet of natural gas—equivalent to removing 33 million cars from the roadways for one year, planting 55 million acres of trees, or eliminating emissions from fifty 500 megawatt coal-fired power plants; or providing enough energy to heat approximately 7.2 million households for one year. These measurable results, if achieved, could lead to stabilized or even declining levels of global atmospheric concentrations of methane.

Bilateral and Regional Partnerships¹⁵: Since 2001, the United States has established 15 climate partnerships with key countries and regional organizations that, together with the United States, account for almost 80 percent of global greenhouse gas emissions. These partnerships encompass over 400 individual activities, and successful joint projects have been initiated in areas such as climate change research and science, climate observation systems, clean and advanced energy technologies, carbon capture, storage and sequestration, and policy approaches to reducing greenhouse gas emissions.

Clean Energy Initiative¹⁶: At the 2002 World Summit on Sustainable Development (WSSD) held in Johannesburg, South Africa, the United States launched a “Clean Energy Initiative,” whose mission is to bring together governments, international organizations, industry and civil society in partnerships to alleviate poverty and spur economic growth in the developing world by modernizing energy services. The Initiative consists of four market-oriented, performance-based partnerships:

- **Global Village Energy Partnership (GVEP)¹⁷** is an international partnership with over 700 public and private sector partners including the World Bank, the UN Development Programme, and leading energy companies. The U.S. implementation of GVEP, led by the USAID, is a ten-year initiative that seeks to increase access to modern energy services for those in developing countries in a manner that enhances economic and social development and reduces poverty. Through U.S. government support for GVEP and other energy access programs, 12.9 million people have received increased access to modern energy services since the 2002 Johannesburg Summit.
- **Partnership for Clean Indoor Air (PCIA)¹⁸:** Poor air quality caused by indoor and outdoor air pollution is related to approximately 1.6 million deaths annually and more than 3 billion people in the developing world face an increased environmental health risk due to breathing elevated levels of indoor smoke from home cooking and heating practices. The PCIA currently has over 140 public and private partners working together to increase the use of affordable, reliable, clean, efficient, and safe home cooking and heating practices to reduce the burden of disease. The partners are contributing their resources and expertise to improve health, livelihood and quality of life by reducing

¹⁵Bilateral partners include Australia, Brazil, Canada, China, Central America (Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama), European Union, Germany, India, Italy, Japan, Mexico, New Zealand, Republic of Korea, Russian Federation, and South Africa.

¹⁶See <http://www.sdp.gov/sdp/initiative/cei/28304.htm>.

¹⁷See <http://www.sdp.gov/sdp/initiative/cei/44949.htm>.

¹⁸See <http://www.sdp.gov/sdp/initiative/cei/29808.htm> and <http://www.pciaonline.org/>.

exposure to indoor air pollution, primarily among women and children, from household energy use. Ten U.S.-funded PCIA pilot projects have already resulted in: (1) more than 800,000 households educated about the health impacts of indoor air pollution from household energy use; (2) over 237,000 people with reduced exposure to indoor air pollution from cooking and heating; and (3) in the 58,000 homes in which improved cooking and heating have been adopted, over 440,000 people demonstrated an increased knowledge of indoor air pollution and mitigation solutions.

- **Partnership for Clean Fuels and Vehicles (PCFV)¹⁹:** The PCFV is working with developing countries to reduce vehicular air pollution by promoting the elimination of lead from gasoline, reducing sulfur from fuels, and introducing clean technologies into new and existing vehicle fleets. The U.S. Environmental Protection Agency (EPA) is a founding member and leading supporter of the PCFV, which has over 80 members from governments, industry, and civil society, representing more than 30 countries. Since the 2002 World Summit on Sustainable Development, PCFV has assisted in the elimination of lead in gasoline in the 49 countries of Sub-Saharan Africa, providing health benefits for over 733 million people. The Partnership's future targets include the global elimination of lead in gasoline by 2008, and the global reduction of sulfur in fuel to 50 parts per million or below globally.
- **Efficient Energy for Sustainable Development (EESD)²⁰:** The EESD initiative aims to improve the productivity and efficiency of energy systems in developing countries, while reducing waste and pollution, saving money and improving reliability through energy-efficient and clean processes and technologies and production modernization. With more than 80 organizations committed to furthering the objectives of the EESD, this partnership has focused on project development, public leadership by example, building local commercial infrastructure for self-sustaining financing and developing sustainable integrated energy community systems.

ITER²¹: In January 2003, President Bush announced that the United States was joining the negotiations for the construction and operation of the international fusion experiment known as ITER.²² If successful, this multi-billion-dollar research project, which is to be sited in Cadarache, France, would advance progress toward producing clean, renewable, commercially-available fusion energy by the middle of the century.

Global Bioenergy Partnership (GBEP)²³: The 2005 G8 Summit at Gleneagles, Scotland, helped launch the GBEP, an Italian initiative to support wider, cost-effective biomass and

¹⁹See <http://www.sdp.gov/sdp/initiative/cei/29809.htm> and <http://www.unep.org/pcfvl/>.

²⁰See <http://www.sdp.gov/sdp/initiative/c17707.htm>.

²¹ ITER member countries include the United States, China, European Union, Japan, Russian Federation, and the Republic of Korea.

²²See <http://www.whitehouse.gov/news/releases/2003/01/20030130-18.html>.

²³See <http://www.globalbioenergy.org/>. GBEP partners are Canada, China, France, Germany, Italy, Japan, Mexico, Russian Federation, the United Kingdom, and the United States of America, the International Energy Agency, UN Food and Agriculture Organization (FAO), UN Conference on Trade and Development, UN Department of Economic and Social Affairs, UN Development Programme, UN Environment Programme, UN Industrial Development Organization, UN Foundation, World Council for Renewable Energy, and the European Biomass

biofuels deployment, particularly in developing countries where biomass use is prevalent. GBEP partners include ten governments and nine international organizations and the United Nations Foundation.

Renewable Energy and Energy Efficiency Partnership (REEEP)²⁴: REEEP seeks to accelerate and expand the global market for renewable energy and energy-efficiency technologies. To date, REEEP has funded over 50 projects in 44 countries that address market barriers to clean energy in the developing world and economies in transition. These projects provide new business models, policy recommendations, risk mitigation instruments, handbooks, and databases for advancing renewable energy and energy efficiency, in addition to delivering measurable greenhouse gas reductions. To further REEEP's agenda, the U.S. has been especially active in developing best practices for financing energy efficiency and renewable energy projects and an open network of affiliated organizations for distributed peer production of models and tools for energy smart community planning and development.

Renewable Energy Policy Network for the 21st Century (REN21)²⁵: REN21 is a global policy network, which connects governments, international institutions and organizations, partnerships and initiatives, and other stakeholders on the political level with those "on the ground," and is aimed at providing a forum for international leadership on renewable energy. Its goal is to allow the rapid expansion of renewable energies in developing and industrial countries by bolstering policy development and decision-making on sub-national, national and international levels. To date, REN21 has produced several notable renewable energy analyses, the most noteworthy being its comprehensive "REN21 Global Status Report." The United States serves as one of the 13 national government entities on REN21's Steering Committee.

Washington International Renewable Energy Conference 2008 (WIREC 2008): On May 1, 2007, Secretary of State Condoleezza Rice announced that the State Department will host the WIREC 2008 in March 2008.²⁶ WIREC 2008 will be the third global ministerial level event on renewable energy and will be an important opportunity for world ministers to show their commitment to renewable energy. The ministers will discuss how renewable energy advances our shared goals for climate, sustainable development and energy security. WIREC 2008 goals include: (1) advancing energy security, climate change, air quality, and sustainable development goals, including agriculture and rural development; (2) demonstrating global leadership in renewable energy research, policy development, technology innovation, commercialization and deployment; and (3) fostering industry and government collaboration to help solve global energy challenges. The U.S. Department of State will host this event, assisted by other relevant Departments and agencies including the DOE, USDA, EPA, USAID, U.S. Department of Interior, and the U.S. Department of Commerce, and with the strong support of the American Council on Renewable Energy. The Department looks forward to cooperating with REN-21 and other relevant stakeholders.

Industry Association. The FAO is hosting the GBEP Secretariat in Rome with the support of the Government of Italy.

²⁴See <http://www.reeep.org/>.

²⁵See <http://www.ren21.net/>.

²⁶See <http://www.state.gov/r/pa/prs/ps/2007/may/84115.htm>.

Other examples of our engagement across the globe in advancing climate change science and addressing greenhouse gas emissions include our participation in the Intergovernmental Panel on Climate Change (IPCC), the Global Environment Facility (GEF) and activities under the Tropical Forest Conservation Act.

Intergovernmental Panel on Climate Change (IPCC)²⁷: The IPCC was established by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) in 1988 to assess scientific, technical and socio-economic information relevant for the understanding of climate change, its potential impacts and options for adaptation and mitigation. It is open to all Members of the United Nations and of WMO. The United States has played an active role in the IPCC since its establishment and has provided more of its funding than any other nation. Dr. Susan Solomon, a senior scientist at the National Oceanic and Atmospheric Administration's Earth System Research Laboratory in Boulder, Colorado, serves as co-chair of the IPCC Working Group I, which is assessing the scientific basis of climate change. The United States hosts the Working Group's Technical Support Unit and hundreds of U.S. scientists are participating in the preparation of the IPCC's Fourth Assessment Report, which is due to be completed later this year.

Global Environment Facility (GEF)²⁸: U.S. participation in the GEF, the financial mechanism under the UNFCCC, is another example of our engagement across the globe of addressing the threat of poverty and greenhouse gas emissions. Launched in 1991, the GEF provides funding (largely grants) for projects that provide global environmental benefits and support sustainable development. Since its inception, has approved over \$6.2 billion in grants, leveraging over \$20 billion in pledged co-financing to support more than 1,800 projects in over 155 countries, with about 33 percent of cumulative allocations supporting the reduction or avoidance of greenhouse gas emissions. For fiscal year 2008, the Administration is requesting \$80.0 million for the second of four payments toward a total U.S. contribution of \$320 million pledged during the fourth replenishment (GEF-4) and \$26.8 million to clear a portion of outstanding U.S. arrears.

Tropical Forest Conservation Act (TFCA)²⁹: Many of our international activities also help to promote the biological sequestration of CO₂, an important tool for addressing climate change that can have benefits both for conservation and climate change. The TFCA authorizes debt relief for low and middle-income countries with tropical forests to support conservation of endangered forests. Since 2000, the United States has concluded 12 TFCA agreements with 11 countries that will generate more than \$137 million for tropical forest conservation over time. Under the TFCA debt swap mechanism, a unique public/private partnership has evolved in which environmental NGOs such as The Nature Conservancy, World Wildlife Fund, and Conservation International have provide additional funds totaling approximately \$9.6 million for debt

²⁷ See <http://www.ipcc.ch/>.

²⁸ U.S. Department of Treasury, Treasury International Programs, Justification for Appropriations, FY2008 Budget Request, pp. 43-44, and 65 (see <http://www.treas.gov/offices/international-affairs/intl/fy2008/fy2008-budget.pdf>).

²⁹ U.S. Department of Treasury, Treasury International Programs, Justification for Appropriations, FY2008 Budget Request, pp. 1, 23, 27, and 68 (see <http://www.treas.gov/offices/international-affairs/intl/fy2008/fy2008-budget.pdf>). TFCA agreements have been concluded with Bangladesh, Belize, Botswana, Colombia, El Salvador, Jamaica, Panama (two agreements), Paraguay, Peru and the Philippines. On July 3, 2007, in response to the Indonesian Government's request, the United States Government announced that Indonesia is also eligible to participate.

reduction, increasing the size of individual agreements, and contributing additional expertise in the management of resulting programs. Seven of the 12 TFCA agreements so far provide for debt swaps. In fiscal year 2008, the Administration has requested a total of \$20 million for TFCA.

3. Near-Term Policies and Measures to Slow the Growth of Greenhouse Gas Emissions

In February 2002, President Bush set an ambitious national goal to reduce the greenhouse gas intensity—that is, emissions per unit of economic output—of the U.S. economy by 18 percent by 2012, a goal we are on target to meet. When announced, this commitment was estimated to achieve a reduction of 100 million additional metric tons carbon equivalent (MMTCE) emissions in 2012, with more than 500 MMTCE emissions in cumulative savings over the decade. To meet the President's goal, the Administration is now implementing numerous programs—including voluntary partnerships, consumer information campaigns, incentives, and mandatory regulation—including the following:

- **Climate VISION (Voluntary Innovative Sector Initiatives: Opportunities Now)³⁰:** In February 2003, President Bush announced that 12 major industrial sectors and The Business Roundtable had committed to work with four of his cabinet agencies (the Departments of Energy, Transportation, and Agriculture and the Environmental Protection Agency) to contribute to meeting his 18 percent intensity reduction goal by improving the energy efficiency or greenhouse gas emissions intensity of its sector. Today, business and trade associations representing 14 energy-intensive industry sectors that account for approximately 40 to 45 percent of total U.S. greenhouse gas emissions have issued letters of intent to meet specific targets. Participating sectors include: aluminum, automotive manufacturers, cement, chemical manufacturing, electric power, forest products, iron and steel, lime, magnesium, minerals, mining, oil and gas, railroads, and semiconductors.
- **Climate Leaders³¹:** Announced in February 2002, Climate Leaders is an EPA partnership encouraging individual companies to develop long-term, comprehensive climate change strategies. Under this program, partners set corporate-wide greenhouse gas reduction goals and inventory their emissions to measure progress. Climate Leaders has grown to include 135 partners whose revenues add up to almost 10 percent of the United States' gross domestic product and whose emissions represent 8 percent of total U.S. greenhouse gas emissions. EPA estimates that GHG reductions by Climate Leaders Partners will prevent more than 11 MMCTE per year—equivalent to the annual emissions of more than 7 million cars.
- **SmartWay Transport Partnership³²:** The SmartWay Transport Partnership is a public-private partnership that aims to reduce greenhouse gas emissions, fuel consumption, and criteria pollutants from ground freight transportation operations. Nearly 550 companies, including some of the nation's largest shippers and carriers, have joined SmartWay. The

³⁰See <http://www.climatevision.gov/>.

³¹See <http://www.epa.gov/climateleaders/>.

³²See <http://www.epa.gov/otaq/smartway/index.htm>.

efforts of these companies, which include the use of fuel efficient technologies and anti-idling devices, improved aerodynamics, and the next generation single wide tires, will reduce greenhouse gas emissions and fuel consumption. SmartWay is also working with truck stop owners to create “No Idling Zones” and install truck stop electrification systems, allowing tired drivers to take their required 10 hour rest period in comfort without having to operate their 450 horsepower engines. EPA estimates that by 2012, the companies that participate in the Partnership will cut CO₂ emissions by up to 66 million metric tons (18.0 MMTCE) per year, and nitrogen oxide emissions by up to 200,000 tons per year. It will save about \$9 billion in fuel costs and as much as 150 million barrels of oil per year—enough oil to heat 17 million houses for one year.

- **ENERGY STAR³³:** In 1992, EPA introduced ENERGY STAR as a voluntary labeling program designed to identify and promote energy-efficient products. EPA has worked closely with its federal ENERGY STAR partner, DOE, to expand the program to new product categories which now total more than 50. Since the early 1990s, EPA has also promoted energy efficiency in commercial buildings. Through their ENERGY STAR partnerships, businesses and organizations of all sizes benefit from energy efficiency resources and guidance that help inform their decisions, enabling them to make cost-effective investments and reduce their energy use by as much as 30 percent. Central elements of EPA’s efforts include promoting energy management as a strategic business objective and promoting performance benchmarking of building energy use to help energy users target their investments.

In 2005, EPA announced a new national ENERGY STAR campaign in coordination with key professional associations and states. The ENERGY STAR Challenge is a call to action for building owners and operators to implement energy efficiency measures and reduce energy use by 10 percent or more. EPA estimates that if each building owner met this challenge, by 2015 Americans would reduce greenhouse gas emissions by more than 20 MMTCE—equivalent to the emissions from 15 million vehicles—while saving about \$10 billion. More than 30 states—along with many other organizations—are participating in the Challenge. They are benchmarking the energy use of their buildings, setting an energy savings target of 10 percent or more, and making the investments necessary to achieve this goal. All of these efforts are contributing to the growing results of the ENERGY STAR program. In 2006, Americans, with the help of ENERGY STAR, implemented energy efficiency measures that saved \$14 billion on their energy bills and prevented greenhouse gas emissions equivalent to those of 25 million vehicles—the number of cars in California and Illinois combined.

- **Green Power Partnership³⁴:** Introduced in 2001 as part of the President’s National Energy Policy, the EPA’s Green Power Partnership is designed to increase the adoption of clean energy supply technologies across the United States. The Partnership assists organizations in demonstrating environmental leadership by choosing electricity products generated from renewable energy sources. It now has more than 750 partners committed to purchasing more than 10 billion kilowatt-hours of green power by the end of 2007,

³³See <http://www.energystar.gov/>.

³⁴See <http://www.epa.gov/greenpower/>.

which would be enough electricity to power more than 620,000 average American homes annually. Achieving this goal will avoid the equivalent CO₂ emissions associated with more than 1.1 million passenger cars each year.

- **Combined Heat and Power (CHP) Partnership**³⁵: Launched in 2001, EPA's Combined Heat and Power Partnership provides technical assistance to promote CHP projects along each step of the project development cycle in order to make investments in CHP more attractive. EPA also educates industry about the benefits of CHP, provides networking opportunities, and works with state governments to design air emissions standards and interconnection requirements that recognize the benefits of clean CHP. The Partnership now includes over 200 partners and through 2006 had assisted more than 250 projects representing 3,577 megawatts of new CHP capacity in a variety of sectors, including university campuses, heavy industry, and the hospitality industry, among others. On an annual basis, these projects will prevent the emissions of approximately 2.86 million metric tons CO₂ equivalent (0.78 MMTCE). This is equivalent to the annual emissions of more than 1.9 million cars, or the sequestration from more than 2.8 million acres of forest.
- **EPA State Clean Energy-Environment Partnership**³⁶: In 2005, EPA launched the State Clean Energy-Environment Partnership Program, designed to help states adopt a variety of clean energy policies and deploy clean energy programs, including both energy efficiency and renewable energy initiatives. Through the State Clean Energy-Environment Partnership program, states use comprehensive guidance on successful, cost-effective policies and initiatives; measurement and evaluation tools for co-benefits of the policies; and peer exchange opportunities to explore and advance new policies. The partnership is working with 15 states which represent about 50 percent of the U.S. population and energy consumption.
- **EPA Domestic Methane Programs**³⁷: The EPA works in collaboration with the private sector and state and local governments to implement several voluntary programs that promote profitable opportunities for reducing emissions of methane, a potent greenhouse gas and clean energy source, from landfills, coal mines, oil and gas systems, and agricultural operations. EPA's methane programs, including the Landfill Methane Outreach Program, Coalbed Methane Outreach Program, Natural Gas STAR, and AgSTAR, are designed to overcome a wide range of informational, technical, and institutional barriers to reducing emissions, while creating profitable methane recovery and use opportunities. The collective results of EPA's methane programs have been substantial. U.S. methane emissions in 2005 were 11.5 percent below 1990 levels, in spite of economic growth over that time period. EPA expects that these programs will maintain emissions below 1990 levels in the future due to expanded industry participation and the continuing commitment of the participating companies to identify and implement cost-effective technologies and practices.

³⁵See <http://www.epa.gov/chp/>.

³⁶See www.epa.gov/cleanenergy/stateandlocal/.

³⁷See <http://www.epa.gov/methane/voluntary.html>.

- **Targeted Incentives for Greenhouse Gas Sequestration:** The USDA provides targeted incentives through its conservation programs to encourage wider use of land management and production practices that sequester carbon and reduce greenhouse gas emissions. USDA also provides financial and technical assistance to help farmers install renewable energy systems and make improvements in energy efficiency that help reduce greenhouse gas emissions. In 2007, USDA's Farm Bill reauthorization proposals would provide approximately \$4.4 billion in conservation activities on agricultural lands, and this level of funding represents an increase of about \$1.6 billion from 2002.³⁸

Through the Conservation Reserve Program (CRP)³⁹, USDA encourages farmers to remove environmentally sensitive lands from production, and also encourages installing vegetative covers that sequester carbon. CRP rules also give landowners the right to sell carbon credits generated from lands enrolled in the program. Also, under CRP, USDA has begun a program to afforest 500,000 acres of bottomland hardwoods. In the Environmental Quality Incentives Program (EQIP),⁴⁰ which encourages adoption of conservation practices on working lands, USDA is rewarding actions that provide greenhouse gas benefits. EQIP also provides financial and technical assistance to farmers for specific technologies and practices with greenhouse gas benefits—including installing anaerobic waste digesters and adopting management systems for residues, irrigation water, nutrients, crops, wetlands, and grazing land that mitigate greenhouse gas emissions. Finally, USDA provides Conservation Innovation Grants⁴¹ to fund the application and demonstration of innovative technologies and approaches to conservation issues. Many of the awards made under this program have greenhouse gas benefits.

- **Improved Corporate Average Fuel Economy (CAFE) Standards:** On April 1, 2003, the Bush Administration finalized regulations requiring an increase in the fuel economy of light trucks for Model Years 2005 to 2007, the first such increase since 1996. The increase from 20.7 miles per gallon to 22.2 miles per gallon by 2007 more than doubles the increase in the standard that occurred between Model Years 1986 and 1996. The new increased fuel economy standards are expected to save approximately 3.5 billion gallons of gasoline over the lifetime of these trucks, with the corresponding avoidance of more than 30 million metric tons of CO₂ equivalent (8.2 MMTCE). The Administration also promulgated a new round of standards in March, 2006. The new standards cover model years 2008-2011 for light trucks and raise fuel economy to 24 miles per gallon for model year 2011. The rule is expected to save 10.7 billion gallons of gasoline over the lifetime of these vehicles, thereby reducing GHG emissions by 73 million metric tons of CO₂ equivalent (19.9 MMTCE).
- **Energy Policy Act of 2005 Tax Incentives to Reduce Greenhouse Gas Emissions:** The Energy Policy Act of 2005 includes over \$14.5 billion in tax incentives from 2005 to 2015. Many of these tax incentives and credits will have significant greenhouse gas

³⁸See Office of Management and Budget, *Fiscal Year 2008 Report to Congress on Federal Climate Change Expenditures*, May 2007, p. 25 at http://www.whitehouse.gov/omb/legislative/fy08_climate_change.pdf

³⁹See <http://www.nrcs.usda.gov/programs/crp/>.

⁴⁰See <http://www.nrcs.usda.gov/PROGRAMS/EQIP/>.

⁴¹See <http://www.nrcs.usda.gov/programs/cig/>.

reduction benefits and are designed to spur investments in clean energy infrastructure, enhance domestic energy security, and promote deployment of conservation and energy efficiency technologies, renewable energy and alternative motor vehicles. The Act also provides authority to DOE to issue loan guarantees for a wide range of advanced technologies that avoid, reduce, or sequester greenhouse gas emissions. Further, it provides standby support coverage to indemnify against certain regulatory and litigation delays for the first six new nuclear plants. In addition, the Act establishes 15 new appliance efficiency mandates and a 7.5 billion gallon renewable fuel requirement by 2012.

- **Voluntary Greenhouse Gas Emission Registry (1605(b))⁴²:** The Voluntary Reporting of Greenhouse Gases Program, authorized under Section 1605(b) of the Energy Policy Act of 1992, provides a means for utilities, industries, and other entities to establish a public record of their greenhouse gas emissions and the results of voluntary measures to reduce, avoid, or sequester greenhouse gas emissions. For the 2005 reporting year, 221 U.S. companies and other organizations reported that they had undertaken 2,379 projects and reduced or sequestered 294 million metric tons CO₂ equivalent (80.2 MMTCE) of direct reductions, 67 million metric tons CO₂ equivalent (18.3 MMTCE) of indirect reductions, 8 million metric tons CO₂ equivalent (2.2 MMTCE) of reductions from carbon sequestration, and 13 million metric tons CO₂ equivalent (3.5 MMTCE) of unspecified reductions. In April 2006, new guidelines were issued for the program. The new guidelines, which go into effect in 2007 for the 2006 reporting year, will strengthen the program by encouraging comprehensive, entity-wide reporting of emissions and emission reductions, including sequestration, and by increasing the measurement accuracy, reliability, and verifiability of reports.
- **American Competitiveness Initiative (ACI)⁴³:** President Bush announced the American Competitiveness Initiative (ACI) in his 2006 State of the Union Address.⁴⁴ Its goals are to increase federal investments in research and development, strengthen education, and encourage entrepreneurship. Over 10 years, the Initiative commits \$50 billion to increase funding for research and \$86 billion for research and development tax incentives, some of which will be directed toward investments in clean energy technology research including solar, bioenergy, wind, hydropower, and hydrogen and fuel cell technology. This research will generate scientific and technological advances, ultimately helping to reduce greenhouse gas emissions both domestically and internationally.
- **Twenty in Ten Initiative⁴⁵:** President Bush announced his Twenty in Ten Initiative in his 2007 State of the Union Address. The goal is to reduce the Nation's gasoline consumption by 20 percent in 10 years by: (1) increasing the supply of renewable and

⁴²See <http://www.cia.doc.gov/oiaf/1605/frntvrgg.html> and <http://www.ei.energy.gov/enhancingGHGRegistry/index.html>.

⁴³See <http://www.whitehouse.gov/stateoftheunion/2006/aci/> and <http://www.ostp.gov/html/budget/2008/ACIUpdateStatus.pdf>.

⁴⁴See <http://www.whitehouse.gov/stateoftheunion/2006/>.

⁴⁵See <http://www.whitehouse.gov/stateoftheunion/2007/initiatives/energy.html>.

other alternative fuels by setting a mandatory fuels standard to require the equivalent of 35 billion gallons of renewable and other alternative fuels in 2017, nearly five times the 2012 Renewable Fuels Standard mandate established by the Energy Policy Act of 2005, to displace 15 percent of projected annual gasoline use in 2017; and (2) reforming and modernizing CAFE standards for cars, and extending the light truck rule to achieve a further 5 percent reduction. As a result of the recent Supreme Court decision in *Massachusetts v. EPA*, the President has directed EPA and the Departments of Transportation, Energy, and Agriculture to take the first steps toward regulations based on the 20 in 10 plan and to complete this regulatory process by the end of 2008.⁴⁶

- **President's Budget⁴⁷:** As noted earlier, from fiscal year 2001 to the end of fiscal year 2007, the U.S. Government will have devoted nearly \$37 billion to climate science and observations, technology, international assistance, and incentive programs. President Bush's fiscal year 2008 budget calls for nearly \$7.4 billion for climate-related activities, includes \$3.9 billion for the Climate Change Technology Program, over \$1.8 billion for the Climate Change Science Program, \$212 million for climate change-related international assistance programs, and nearly \$1.4 billion for energy tax provisions that may reduce greenhouse gas emissions.

We expect these efforts will contribute to meeting the President's 10-year goal to reduce the Nation's greenhouse gas intensity by 18 percent, which represents an average annual rate of improvement of about 1.96 percent. According to EPA data reported to the UNFCCC Secretariat, U.S. greenhouse gas intensity declined by 1.9 percent in 2003, by 2.4 percent in 2004, and by 2.4 percent in 2005. Put another way, from 2004 to 2005, the U.S. economy increased by 3.2 percent while greenhouse gas emissions increased by only 0.8 percent. Further, a May 21, 2007 preliminary "flash estimate" by the Energy Information Administration of energy-related CO₂ emissions—which account for more than four fifths of total greenhouse gas emissions—shows an absolute drop in these emissions of 1.3 percent and an improvement in CO₂ emissions intensity of 4.5 percent in 2006.⁴⁸ Although we are only a few years into the effort, the Nation is on track to meet the President's goal.

Progress in the U.S. since 2000 compares favorably with progress being made by other countries. *Trends in GHG [Greenhouse Gas] Emissions: 2000-2005* (Attachment 2) and *Trends in CO₂ Emissions: 2000-2005* (Attachment 3) show how GHG and CO₂ emission trends in the U.S. compare to other industrialized countries based on national data reported to the UNFCCC Secretariat. These data, which include countries that have obligations under the Kyoto Protocol, indicate that from 2000 to 2005 the major developed economies of the world are at about the same place in terms of actual greenhouse gas 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 U.S. has seen its actual greenhouse gas emissions increase by 1.6 percent—slightly more than that for the EU. In contrast, U.S. CO₂ emissions over the same period increased by 2.5 percent—less than the increase for the EU.

⁴⁶See <http://www.whitehouse.gov/news/releases/2007/05/20070514-2.html>.

⁴⁷See http://www.whitehouse.gov/omb/legislative/fy08_climate_change.pdf.

⁴⁸See <http://www.eia.doe.gov/ncic/press/press284.html>.

4. Advancing Climate Change Science

The President established the U.S. Climate Change Science Program (CCSP)⁴⁹ in 2002 as part of a new ministerial-level management structure to oversee public investments in climate change science and technology. The CCSP incorporates the U.S. Global Change Research Program, established by the Global Change Research Act of 1990, and the Climate Change Research Initiative, established by the President in 2001. The Program coordinates and integrates scientific research on global change and climate change sponsored by 13 participating departments and agencies of the U.S. Government. It is responsible for facilitating the development of a strategic approach to federally supported climate research, integrated across the participating agencies. The President's budget requests \$1.836 billion for CCSP in fiscal year 2008.

Its principal aims are to investigate natural and human-induced changes in the Earth's global environmental system, monitor important climate parameters, predict global change, and provide a sound scientific basis for national and international decision-making. In 2003, CCSP released its strategic plan for guiding climate research. The plan is organized around five goals: (1) improving our knowledge of climate history and variability; (2) improving our ability to quantify factors that affect climate; (3) reducing uncertainty in climate projections; (4) improving our understanding of the sensitivity and adaptability of ecosystems and human systems to climate change; and (5) exploring options to manage risks. Since CCSP was created in 2002, the program has successfully integrated a wide range of the research and climate science priorities of the 13 CCSP agencies. CCSP has taken on some of the most challenging questions in climate science and is developing products to convey the most advanced state of knowledge to be used by federal, state and local decision makers, resource managers, the science community, the media, and the general public.

Twenty-one Synthesis and Assessment Products are identified in the Strategic Plan to be produced through 2008. The first of these, *Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences*, was released in April 2006 and answers a set of key questions related to ongoing observations of the Earth's temperature. The reports, overall, are designed to address a full range of science questions and evaluate options for responses that are of the greatest relevance to decision and policy makers and planners. The products are intended to provide the best possible state of science information, developed by a diverse group of climate experts, for the decision community.

5. Accelerating Climate Change Technology Development and Deployment

While acting to slow the pace of greenhouse gas emissions intensity in the near term, the Administration is laying a strong technological foundation to develop realistic mitigation options to meet energy security, economic development, and climate change objectives.

⁴⁹See <http://www.climatechange.gov>.

The Bush Administration is moving ahead on advanced technology options that have the potential to substantially reduce, avoid, or sequester future greenhouse gas emissions. Over 80 percent of current global anthropogenic greenhouse gas emissions are energy related, and although projections vary considerably, a tripling of global energy demand by 2100 is not unimaginable.⁵⁰ Therefore, to provide the energy necessary for continued economic growth while we reduce greenhouse gas emissions, we will have to develop and deploy cost-effective technologies that alter the way we produce and use energy.

The Climate Change Technology Program (CCTP)⁵¹ was created in 2002 (and subsequently authorized in the Energy Policy Act of 2005) to coordinate and prioritize the Federal Government's climate-related technology research, development, demonstration, and deployment (RDD&D) activities and to further the President's National Climate Change Technology Initiative (NCCTI). For fiscal year 2008, Administration has requested \$3.917 billion, about \$685 million of which is for the 12 discrete priority activities that make up the NCCTI.

CCTP's strategic vision has six complementary goals: (1) reducing emissions from energy use and infrastructure; (2) reducing emissions from energy supply; (3) capturing and sequestering CO₂; (4) reducing emissions of non-CO₂ greenhouse gases; (5) measuring and monitoring emissions; and (6) bolstering the contributions of basic science. Ten Federal agencies support a broad portfolio of activities within this framework.

CCTP's principal aim is to accelerate the development and reduce the cost of new and advanced technologies that help to reduce, avoid, or sequester greenhouse gas emissions. It does this by providing strategic direction for the CCTP-related elements of the overall Federal technology portfolio. It also facilitates the coordinated planning, programming, budgeting, and implementation of the technology development and deployment aspects of U.S. climate change strategy.

The Administration continues strong investment in many strategic technology areas. As the President's National Energy Policy requires, the strategic technology efforts with respect to energy production and distribution focus on ensuring environmental soundness, as well as dependability and affordability.

Advanced Energy Initiative (AEI)⁵²: In his 2006 State of the Union Address,⁵³ President Bush announced plans for the Advanced Energy Initiative (AEI), which will help reduce America's greenhouse gas emissions, pollution, and dependence on foreign sources of energy by accelerating advanced energy technologies. Examples of AEI investment include the Solar America Initiative, the Biomass/Biofuels Initiative, the Hydrogen Fuel Initiative, the FutureGen near zero-emissions coal-fired power plant; and Nuclear Power 2010. By investing in these and other advanced energy technologies, AEI will allow us to alter the way we power our homes and

⁵⁰See *U.S. Climate Change Technology Program Strategic Plan*, September 2006, p. 2 at <http://www.climatecctc.org/stratplan/final/CCTP-StratPlan-Sep-2006.pdf>.

⁵¹See <http://www.climatecctc.org/>.

⁵²See http://www.whitehouse.gov/stateoftheunion/2006/energy/energy_booklet.pdf

⁵³See <http://www.whitehouse.gov/stateoftheunion/2006/>.

automobiles within 20 years. The President's budget for fiscal year 2008 includes \$2.7 billion in the Department of Energy for the AEI, an increase of 22 percent above the 2007 enacted level.

Energy Efficiency and Renewable Energy⁵⁴: Energy efficiency may have significant short-term potential to reduce energy use and greenhouse gas emissions. Renewable energy includes a range of different technologies that can play an important role in reducing greenhouse gas emissions. The United States invests significant resources in wind, solar photovoltaics, geothermal, and biomass technologies.

Hydrogen⁵⁵: President Bush announced his Hydrogen Fuel Initiative in his 2003 State of the Union Address.⁵⁶ The goal is to work closely with the private sector to accelerate our transition to a hydrogen economy, on both the technology of hydrogen fuel cells and a fueling infrastructure. The President's Hydrogen Fuel Initiative and the FreedomCAR Partnership⁵⁷ which was launched in 2002 will provide \$1.7 billion through 2008 to develop hydrogen-powered fuel cells, hydrogen production and infrastructure technologies, and advanced automotive technologies, with the goal of commercializing fuel-cell vehicles by 2020.

Carbon Sequestration: Carbon capture and sequestration is a central element of CCTP's strategy because for the foreseeable future, fossil fuels will continue to be the world's most reliable and lowest-cost form of energy. A realistic approach is to find ways to capture and store the CO₂ produced when these fuels are used at centralized power generation and industrial applications. DOE's core Carbon Sequestration Program⁵⁸ emphasizes technologies that capture CO₂ from large point sources and store it in geologic formations. In 2003, DOE launched a nationwide network of seven Regional Carbon Sequestration Partnerships,⁵⁹ involving State agencies, universities, and the private sector, to determine the best approaches for sequestration in each geographic region represented and to examine regulatory and infrastructure needs. Today the partnerships include more than 300 organizations in 40 U.S. states, three Indian nations, and four Canadian provinces. The Regional Partnerships have progressed to a validation phase and are beginning an initial round of at least four large-scale field tests involving the injection of CO₂ into underground formations where it will be stored and monitored.

Coal-Fired, Near-Zero-Emissions Power Generation: The United States has vast reserves of coal, and about half of its electricity is generated from this fuel. Advanced coal-based power and fuels, therefore, is an area of special interest from both an energy security and climate change perspective. The Coal Research Initiative (CRI) consists of research, development, and demonstration of coal-related technologies that will improve coal's competitiveness in future energy supply markets. The Clean Coal Power Initiative (CCPI),⁶⁰ within the CRI, is a cost-shared program between the government and industry to demonstrate emerging technologies in coal-based power generation and to accelerate their commercialization. A major priority under

⁵⁴See <http://www.eere.energy.gov/>.

⁵⁵See www.hydrogen.gov.

⁵⁶See <http://www.whitehouse.gov/news/releases/2003/01/20030128-19.html>

⁵⁷See <http://www.eere.energy.gov/vehiclesandfuels/>.

⁵⁸See <http://www.fe.doe.gov/programs/sequestration/index.html>.

⁵⁹See <http://www.fe.doe.gov/programs/sequestration/partnerships/>.

⁶⁰See <http://www.fe.doe.gov/programs/powersystems/cleancoal/index.html>.

the CRI is the FutureGen project,⁶¹ a 10-year, \$1 billion international government-industry cost-shared effort to design, build, and operate the world's first near-zero atmospheric emissions coal-fired power plant. This project, which cuts across many CCTP strategic areas, will incorporate the latest technologies in carbon sequestration, oxygen and hydrogen separation membranes, turbines, fuel cells, and coal-to-hydrogen gasification. Through the CRI, clean coal can remain part of a diverse, secure energy portfolio well into the future.

Nuclear Fission: Concerns over resource availability, energy security, and air quality as well as climate change suggest a larger role for nuclear power as an energy supply choice. While current generations of nuclear energy systems are adequate in many markets today, new construction of advanced light-water reactors in the near term and of even more advanced systems in the longer term can broaden opportunities for nuclear energy, both in industrialized and developing countries. The Nuclear Power 2010 program⁶² is working with industry to demonstrate the Nuclear Regulatory Commission's new licensing process, and earlier this year the Nuclear Regulatory Commission approved the Early Site Permits for two new nuclear power plants.

The Generation IV Nuclear Energy Systems Initiative⁶³ is investigating the more advanced reactor and fuel cycle systems that represent a significant leap in economic performance, safety, and proliferation-resistance. One promising system being developed under the Nuclear Hydrogen Initiative⁶⁴ would pair very-high-temperature reactor technology with advanced hydrogen production capabilities that could produce both electricity and hydrogen on a scale to meet transportation needs. Complementing these programs is the Advanced Fuel Cycle Initiative⁶⁵, which is developing advanced, proliferation resistant nuclear fuel technologies that can improve the fuel cycle, reduce costs, and increase the safety of handling nuclear wastes.

Fusion⁶⁶: Fusion energy is a potential major new source of energy that, if successfully developed, could be used to produce electricity and possibly hydrogen. Fusion has features that make it an attractive option from both an environmental and safety perspective. However, the technical hurdles of fusion energy are very high, and with a commercialization objective of 2050, its impact would not be felt until the second half of the century, if at all. Nevertheless, the promise of fusion energy is simply too great to ignore.

Advances in these and other technology areas in the CCTP portfolio could put us on a path to ensuring access to clean, affordable energy supplies while dramatically reducing the greenhouse gas profile of our economy over the long term. Moreover, the deployment of cleaner energy technologies in developing economies like China and India can make a huge difference in altering the future global energy picture.

⁶¹ See <http://www.fc.doe.gov/programs/powersystems/futuregen/index.html>.

⁶² See <http://www.ne.doe.gov/np2010/neNP2010a.html>.

⁶³ See <http://www.ne.doe.gov/genIV/neGenIV1.html>.

⁶⁴ See <http://www.ne.doe.gov/NHI/neNHI.html>.

⁶⁵ See <http://www.ne.doe.gov/AFCI/neAFCI.html>.

⁶⁶ See <http://www.energy.gov/sciencetechn/fusion.htm>.

6. Concluding Remarks

President Bush 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.

President Bush has repeatedly highlighted the importance of international cooperation in developing an effective and efficient global response to the complex and long-term challenge of climate change. Under his leadership, the United States has brought together key nations to tackle jointly some tough energy and science challenges. Furthermore, on May 31, 2007, the President called upon the world's major economies to set a global goal on long-term greenhouse gas reductions. As part of this new international global strategy, the President proposed to convene a series of meetings with other countries—including rapidly growing economies like India and China—to establish a new framework for the post-2012 world. Each country would establish midterm national targets and programs that reflect their own current and future energy needs. The President believes that by encouraging and sharing cutting-edge technologies, major emitters will be able to meet realistic reduction goals.

Mr. Chairman and Members of the Subcommittee, I thank you for this opportunity to testify before this Subcommittee on behalf of the Department of State. I would be pleased to answer any questions you may have.

**Attachment 1: U.S.-Initiated Multilateral and
Bilateral/Regional Partnerships—1 of 2**

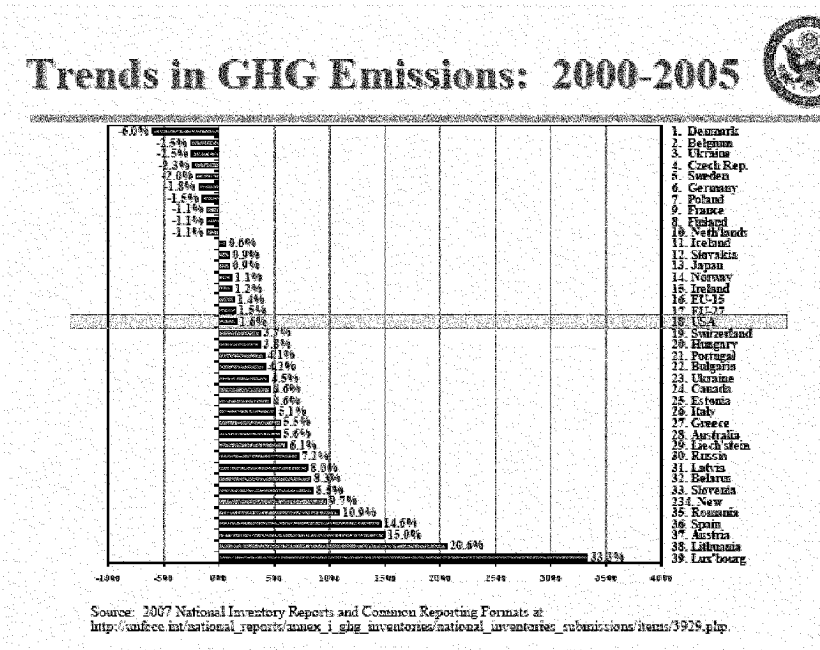
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**Attachment 1: U.S.-Initiated Multilateral and
Bilateral/Regional Partnerships—2 of 2**

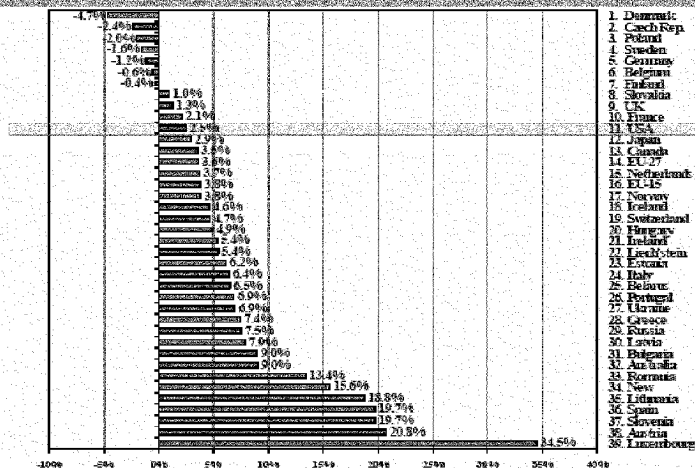
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South Africa								
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Switzerland								
Thailand								
Tunisia								
Uganda								
Ukraine								
UK								
Uzbekistan								
Vietnam								

APP: Asia-Pacific Partnership Clean Development and Climate
 CSLF: Carbon Sequestration Leadership Forum
 GEO: Group on Earth Observations
 GIF: Generation IV International Forum
 GNEP: Global Nuclear Energy Partnership
 IPHE: International Partnership for a Hydrogen Economy
 M2M: Methane to Markets Partnership

Attachment 2



Attachment 3

Trends in CO₂ Emissions: 2000-2005

Source: 2007 National Inventory Reports and Common Reporting Formats at
http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/3929.php.

Mr. FALEOMAVAEGA. I am going to ask my good friend, the ranking member, for his questions.

Mr. MANZULLO. Thank you.

First of all, I appreciate your testimony. What has bothered me in this whole debate is that we spend a lot of time trying to come up with whether or not global warming exists, when, in fact, the issue is not global warming; the issue is global pollution. Everybody agrees that we have to do whatever we can in order to bring down the level of global pollution. It has become quite bothersome that there is so much flag-waving going on that if you don't believe in global warming—in fact, I think the weather television station said they won't hire meteorologists unless they believe in global warming, which I think is intellectual dishonesty. I hope my statement is correct. Different TV figures, such as Al Gore, et cetera, having concerts all over the country, all over the world, I just wonder how much energy it costs to put on these concerts to talk about global warming.

What really bothers me is the fact that we can spend a lot of time on the issue of global pollution. I have a son with asthma. I don't know whether the weather is warming or not, but I do know that the cleaner air we have, the easier it is for him to breathe, and that is what my emphasis has been on the whole topic.

Dr. Watson, I wonder if you could comment on the overall argument or theme, as I see it, and whether or not that, in fact, is really hindering the remediation of global pollution.

Mr. WATSON. Well, I would say actually they are intimately related, and that is why we like to address things as a bundle, as I was saying. Again, depending upon the numbers that you get, for many developed countries, for example, 80-plus percent of the so-called greenhouse gas emissions come from power production. For some of the tropical countries there is more from—there is a greater mix from emissions from deforestation. But clearly, when you have power production, and particularly when you are seeing China, for example, putting in a billion watts of coal power a week with, I would say, probably not the best of what we would call traditional pollution controls, you are seeing a tremendous amount of not only greenhouse gas emissions, but also air pollution, the SO_x/NO_x, particulate matter and so on. And those of you, of course, who have been in China, could attest to the quality of the air in a number of the cities there.

So the thing is when we attack, for example, when we go after trying to make coal-fired power plants more efficient, introduce new technologies in that, we get at both issues. We get at the air pollution issue; we also get at the greenhouse gas issue. So again, what we are looking for is win-win situations.

One of the problems that we see with the international debate too often is that you have environment ministers sitting there only looking at one small aspect. And we don't believe that is the way to proceed or actually engage the developing world in particular who have to have energy. We have 2 billion people without access to modern energy services, and believe me, poverty is a major pollutant in itself. It has been referred to many times.

Mr. MANZULLO. In the district that I represent, there is a company, Rentech, that is converting from making anhydrous ammonia

from natural gas to the Fischer-Tropsch process of scrubbing high-sulfuric coal that comes in from central and southern Illinois. As a result of scrubbing that coal, they not only make the main products of anhydrous ammonia and urea, but also diesel fuel. That is coming under heavy scrutiny by people talking about global warming. I think half the power in this country comes as a result of coal.

So I appreciate what you are saying, and I just wish that more emphasis was placed upon the new technologies of trying to clean the environment as opposed to whether or not global warming exists. I noticed that Buenos Aires had its first snowstorm in 86 years the past couple days. Several people died because of the cold. I guess if you want to have a cold summer, just try putting in a swimming pool. But I say that facetiously because of the different weather.

In 1967, on the Fourth of July in Rockford, Illinois, it was freezing. It was 32 degrees. I recall that because my parents have a drive-in restaurant, and they actually closed because no one got root beers or pizza, burgers at 32 degrees. And we have these different waves of climate change that are going on constantly. I just want to do my part as a Member of Congress, and as a father and a steward of the environment, because we also have a small farm and raise beef cattle, to do everything we can to clean the environment regardless of whether or not people believe that global warming exists.

I appreciate your testimony.

Thank you, Chairman.

Mr. FALEOMAVAEGA. The gentleman from California.

Mr. ROHRBACHER. Thank you, Mr. Chairman.

It has been my honor and privilege to work with Dr. Watson in the past. And maybe a few questions. I guess first and foremost, do you believe that the changes in the Earth's temperature in the past, all these where the glaciers were moving back and forth, and the changes that we see now that are taking place on Jupiter and Mars and other planets, do you think these things are, number one, natural occurrences? They certainly can't be attributed to human action. Why is it that we are predicating our actions that this particular change in the climate is different than those changes on other planets and those changes that have taken place on the planet before?

Mr. WATSON. Clearly there is a large natural component. We don't think, anyway, that there are humans on Jupiter and Mars, so that can't be the issue there. Clearly there have been large swings; you look back in history, in the Earth's natural climate.

What has happened, of course, in the last 100-plus years, and is increasing more and more, the reality is we are changing the chemistry of the climate—I mean, there is no doubt about that—by primarily by burning fossil fuels. And there is a connection between that. There is also no doubt about the measurements that the Earth has warmed approximately 1 degree Centigrade over the past 100 years. There is no doubt about that.

Mr. ROHRBACHER. I think it was over 150 years that the Earth has supposedly increased its temperature by 1½ points, degrees.

Mr. WATSON. It depends whether you use Fahrenheit or Centigrade.

Mr. ROHRABACHER. Right. And that was about in the 1850 s is when we began these calculations. Is there something about that era, the 1850s, that is significant in terms of temperature-wise for the world? Wasn't that the end of the mini ice age? Aren't we talking about an increase in $1\frac{1}{2}$ degrees temperature after a 500-year decline in the world's temperatures?

Mr. WATSON. Yes, in teasing out, you know, what, again, during that era—exactly what percentage is human-induced and what percentage is natural is a challenge—it is still a challenge.

Mr. ROHRABACHER. In terms of greenhouse gases, how many of the greenhouse gases, or what percentage are contributed or can be attributed to human activity, and how many can be attributed to volcanoes, rotting woods and forests and things such as that?

Mr. WATSON. Well, in terms of the natural carbon cycle, of course, the biggest greenhouse gas by far is water vapor, as you know. And, as you know, the human-induced element is only a small percentage in the overall carbon scheme.

Mr. ROHRABACHER. Small percentage, which is like 1 or 2 percent?

Mr. WATSON. Something like that.

Mr. ROHRABACHER. Okay. Well, I think it is a bit grandiose for us to believe that we are going to with our—by focusing on what the human contribution, that 1 or 2 percent, that that is going to change some major climate cycle that is going on. However, as my good friend just stated, the issue of global pollution is another issue. Those of us who are trying to make sure we don't waste resources are not people who want to have dirtier engines and dirtier air. We just want to focus on those things that we can do and accomplish that will have some impact. Focusing on CO₂—now, CO₂, Dr. Watson, correct me if I am wrong, CO₂ is not something that is hazardous to human health; is that correct?

Mr. WATSON. Obviously, if it gets to high enough concentration, you can asphyxiate.

Mr. ROHRABACHER. Right. At some point. But in terms up until—it is not foreseeable that we would ever achieve that in hundreds of thousands of years.

Mr. WATSON. That, I believe, is correct, yes.

Mr. ROHRABACHER. All right. But there are other things that are being spit into the atmosphere that cause harm to young people, to kids, and threaten future generations as well as this generation. I believe that all the so-called focus on climate change is taking away resources and efforts and expertise that could be put to good use protecting people against global pollution. For example, we have right now a fight with what—we need to be energy self-sufficient and we need to fight pollution. Now, those goals should not be contradictory to the goals that people have set up for trying to fight climate change. If there is some way that those two things could be molded so we are focusing on the pollutants that hurt people's health rather than trying to focus on things like CO₂, you would find, I think, a great more—a great deal more consensus and support on both sides of the aisle for doing these sort of things.

Let me note that I am working right now with the Governor of California, Arnold Schwarzenegger, with whom I disagree on the global warming theory, but who agrees with me that we can have,

you know, a parallel fight here and really do things that help us become energy self-sufficient, help us clean up the pollution that is damaging to people's health, while still perhaps addressing the climate change issue. Do you think that perhaps this administration is trying to take that approach?

Mr. WATSON. Yes. Certainly. Again, I have listed in my testimony—if you look through all of the actions we are taking, we have a heavy technology focus. We cannot get from here to there without newer and better technologies and cleaner technologies.

Mr. ROHRABACHER. Which also make us self-sufficient and also helps protect people's health.

Mr. WATSON. Yes.

Mr. ROHRABACHER. That, I believe, is the right approach. And the idea of just wasting money, thinking we are in some way going to change a climate cycle on this planet any more than we can change the climate cycle on Jupiter or Mars is a waste of resources.

Thank you very much, Mr. Chairman.

Mr. FALEOMAVAEGA. Thank the gentleman from California for his statements.

Dr. Watson, I remember, I think, about 5 or 6 years ago when former Secretary of State Colin Powell first appeared before this committee. At that time there were some very serious concerns about many of the low-lying island states, especially in the Pacific—I suppose it is probably true in other regions of the world—and the fact that these islands are sinking. And, of course, what came to my mind when I asked Secretary Powell is: What is the administration's policy toward the Kyoto Protocol, at that time pending? His response to the committee was that he is beginning to get into the area of negotiating or engaging, or whatever it was that he was intending to do dealing with the Kyoto Protocol. Well, 2 months later the White House announced that there was no such thing as the Kyoto Protocol, and there is no participation, and everything of the sort.

And I just wanted to ask you, it seems that the administration treats the Kyoto Protocol like it was some dreaded disease, like you don't want to have nothing to do with it, because it seems to me that the Kyoto Protocol was a precursor to the 1992 United Nations Climate Change Protocol or Convention that was approved unanimously by the U.S. Senate under George Bush 41.

And so all this came about with the years of negotiations dealing with the Kyoto Protocol. The concern that I have is not so much that whether to debate the pluses and the minuses and the substances of the Kyoto Protocol, was the fact that we just simply refused to engage the whole idea even though, yes, India and China may have been exempted. But my concern is: Why did we just leave the table and not continue engaging those countries that may receive better treatment than we did as far as emissions standards?

And that was the only thing that I have a sense of disagreement, why the administration just completely left the table. You know, someone once said that if you are not at the table, you are going to be on the menu. And I think you will understand that from that time on our country has been severely criticized by many countries of the world that even if we may have disagreed with the substance

of the Kyoto Protocol, but why did we just—why didn't we continue the engagement process?

And I noticed that with the initiatives, as you stated earlier in your statement, in May of this year the President has made all these proposals before the G-8 group of countries. And then you have all these regional organizations that we are doing independently, aside from what the other 169 countries are trying to achieve through the implementation of the Kyoto Protocol. Can you share that with us?

Mr. WATSON. Yes. Let me get back to your first point. I would posit if we had stayed engaged in conversations with the Kyoto Protocol, they would still be going on, and we would still be severely criticized. You know, the problem with the protocol is two-fold. One was the 1990, of course, arbitrary date which was picked. And it primarily goes back to the underlying date in the Framework Convention. And there was no way, of course, that we could meet the targets that were signed up to and agreed to in 1997. So there was one hurdle.

The second hurdle is, of course, there is no developing country participation. As you said in your opening remarks, the Chinas, Indias, Brazils, and other large emitters around the world. There is no way that an agreement like that could have ever been ratified in the United States Senate. And this administration is not going to do some sort of a symbolic gesture, you know, just to bring something back home and have it rejected in the Senate. And I think that sentiment still holds.

Obviously, the tone has changed on the Hill considerably. I haven't perused all of the bills, but the sense of what is called the Byrd-Hagel resolution, the importance of not harming the U.S. economy and importance of engaging the larger—all the large emitters is still a sentiment which I think resides here. Of course, the previous administration—and you can certainly ask Mr. Diringier to comment on that—I think made heroic efforts to understanding what the sense of the Senate was to try to get developing country engagement. And this just was no, no, no, no. And it has continued to be no, no, no, no. And so basically the President had two choices. I mean, we could have gone ahead and continued in those discussions for year after year after year, continually getting pounded, of course, or just say, okay, the rest of the world wants to do that, that is up to them, but we are going to take a different approach.

Mr. FALEOMAVEGA. You know that one of the provisions under the Kyoto Protocol is in anticipation of what is to come after 2012. And here again I sense the administration is very reluctant to make any sense of commitment, again in view of the participation of some 169 countries in the process, whether it be for good or for bad. But my concern is what is the administration's position? What do we do after 2012 when the Kyoto Protocol mandates more or less when it expires in that time?

Mr. WATSON. Well, you know, the convention itself, the Protocol is just one way to implement the convention. The convention itself is very flexible. I almost like to say—it is very broad-based—I almost liken it to the Constitution. It is not a very long document,

but there are lots of ways you can go about implementing it. The Kyoto Protocol was one approach to doing that.

And so there are a lot of ways, a lot of different ways that you can approach to get to the issue, which is the—you know, the ultimate objective in the convention is stabilization of atmospheric concentrations of greenhouse gases. There are many approaches to that. I would just have you look, for example, at figures 2 and 3 of my written testimony that compares, at least how other nations have done, both greenhouse gas emissions and carbon dioxide emissions, since 2001, when the President took office, as opposed to what has happened in the rest of the world.

We are very close on greenhouse gases to Europe, whether you include the original 15 that were in the Kyoto Protocol or the broader 27 now. And we are actually doing much better than them on carbon dioxide emissions. We are doing something right. They are trying to do it following Kyoto, using a cap-and-trade system. The point is we are all making about the same rate of progress, which isn't great. I mean, everybody's emissions are kind of creeping up.

Now, if you step back to the 1990 level, it looks like, you know, countries—and some countries have taken them way down from where they were in 1990, but typically it had nothing to do because of the convention or Kyoto Protocol. It had to do with the collapse of the former Soviet Union, it had to do with the reunification of Germany, it had to do with, say, the “dash for gas,” as it is called in the United Kingdom. But if you look at what is happening, they were all making about—with few exceptions—about the same rate of progress, again using very different approaches.

And I think what we have added in the debate is the importance of technology and technology development. I think that has now captured the imagination of the world. And we have again examples I have given on our technology partnerships. People understand we have to develop and deploy new, better technologies not only that will address climate change, but also address traditional air pollution, and will also allow the economies of the world to grow and get at those 2 billion people that don't have access to modern energy services.

Mr. FALEOMAVAEGA. Let me ask you this, and correct me if I am wrong. I don't know, I have read it somewhere, that our country's population is only about 4 or 5 percent of the world's population, and yet we consume about 33 percent of the world's energy resources. With that scale, does that mean that we are contributing to some extent global emissions in dealing with carbon dioxide as well as greenhouse gases? Just the sheer amount of resources that we consume as a country worldwide. I mean, we consume 33 percent of the world's energy resources. What does this mean? Does this have an impact on climate change?

Mr. WATSON. Well, certainly we are the largest consumer in the world. We are also the largest producer in the world. And so our emissions are roughly in line with our production and consumption. Certainly it is contributing to the overall environmental footprint in the world, whether it is CO₂ or SO₂ or whatever.

But, however, I have to go back, I think, to your first comment, and I believe you are right. There has been a recent analysis at

least—it probably hasn't been recognized by China yet—but recently recognized by the Dutch environmental agency that has China overtaking us in emissions by some 8 percent, I believe, this year. So we are no longer number one.

But certainly, certainly we can do better, and there are ways that we can be more energy-efficient. And that is one of the things that we are certainly promoting.

Mr. FALEOMAVAEGA. I wanted to put these two terms in. Maybe you can help me. Global pollution. Is there any linkage to climate change? And I like my friend's term "global pollution." It is more realistic. When you talk about pollution, you know what it sounds like. Climate change, it is a little vague and somewhat illusionary.

Mr. ROHRABACHER. We are winning him over.

Mr. FALEOMAVAEGA. Please.

Mr. WATSON. Yes, almost everything that gets to the atmosphere impacts the atmospheric chemistry. So although it is not listed in the Kyoto Protocol, you only have the six gases listed, but you do have things like aerosols, for example, that are produced from, you know, small particulates that are produced when you burn fossil fuels. You have NO_x or SO_x, SO₂ emissions that come off of burning fossil fuels is also—actually contributes to help cool the atmosphere. So practically every substance—as I say, as I mentioned earlier in my conversation with Mr. Rohrabacher, water vapor is the largest greenhouse gas. So almost every human activity that we have, as well as natural ones, are contributing, you know, to "the level of greenhouse gases in the atmosphere."

Mr. FALEOMAVAEGA. I know my friend from California might have a different opinion, but it is my understanding Governor Schwarzenegger and the California State government is really taking the initiative in addressing the issue of gas emissions. Do you think this is something our Federal Government should follow suit?

Mr. WATSON. Well, I think that—and again, we view the laboratory—the State as a great laboratory.

Mr. FALEOMAVAEGA. Some 400 cities, I am sorry, also.

Mr. WATSON. Excuse me, yes, certainly you have 400 cities. You have a number of States, the RGGI States, the Northeastern States, now the Western States. I think it is going to depend—it is an interesting experiment. Much is going to depend upon the resources of the State. And I am not just talking about money, I am talking about how much wind do they have, how much solar they have, how much hydro; you know, their resource base in terms of coal, natural gas, and so on. So it is going to be very dependent on that.

The problem is with setting something at the national level. You say one size fits all, and of course that may not be able to accommodate the needs of a number of States. I think it is a large experiment, and I would want to note, however, that in Governor Schwarzenegger's very aggressive plan, he is only bringing down California's emissions to 1990 levels by 2020. And this is much more—and, of course, he is talking about perhaps 80 percent by mid-century. But the European Union is talking about 20 percent below 1990 by 2020. So they are talking about something much more aggressive. And I think there are obviously concerns in California and other States on what this will cost.

Mr. FALEOMAVAEGA. Unfortunately, Dr. Watson, we have a vote pending right now on the floor, and I know we have to take a little break here, if it is all right with you. There may still be some more questions. So the committee stands temporarily in recess.

[Recess.]

Mr. FALEOMAVAEGA. The hearing will resume.

I just want to note for the record that my good friend and ranking member has no further questions. So procedurally I am told that parliamentary-wise, I am not supposed to proceed until there are at least two members, but I have known for at least the last 100 years we have always had only the chairman presiding, whether Republican or Democrat.

At any rate, thank you so much for your patience, Dr. Watson, and for joining us again this afternoon to resume the hearing. And I do have a couple more questions if it is all right with you. I want to know a couple of things.

You know, with all of the hype that went on with Vice President Gore's presentation of the Inconvenient Truth, which got him the Oscar award, about environmental issues, do I take it that the President really is serious about climate change issues as we have tried to discuss this in terms of how important it is as part of our national psyche, if you will.

Mr. WATSON. Yes. I think the seriousness with which the President is taking the issue is demonstrated by the \$37 billion requests that he has sent to the Hill and Congress has been, of course, so generous in providing the resources and we hope will continue to provide the resources. And he spends many, many hours on it. He has talked about energy issues which are involved in climate change and he has talked about climate change repeatedly over the course of the years, and he has even discussed it more and certainly he had intense discussions at the G-8 in Germany.

He will intend to, of course, participate in some fashion at Secretary General Ban Ki-moon's event in New York. And of course he brought forward his initiative to try to move the ball forward in the international process.

So he takes it very seriously.

Mr. FALEOMAVAEGA. I don't mean to throw a curve ball at you. I just want to ask this question.

Do you think that years ago Vice President Cheney's meeting with major energy companies set the stage or impacted this administration's whole outlook about global warming, climate change, gas emissions, carbon dioxide?

There is no question, and I could not agree more with my friend from Illinois. There is definitely an economic question involved here in terms of our own country's own economic instability, based on what we are really committed to address this very serious issue, if it is a serious issue. After all, in 1992 Bush 41 not only endorsed it and supported it and had the—unanimously endorsed by the U.S. Senate and I always look at the 1992 convention through the United Nations endorsed by our country as the precursor. In other words, there was an absolute recognition by our leaders that we have got a problem with climate change.

But when Bush 43 came into power, it seems like the Kyoto Protocol, as you cited correctly, that there were some very serious pro-

visions of the Kyoto Protocol that were in question. But should we—as I have said, my disagreement, why didn't we continue and engage in the process rather than just pull out and say we are going to do our own thing?

That is what I am trying to get some sense of an understanding of what exactly is this administration's priority, if it is a priority. You say \$37 billion. What have we done with the 37 billion? What have we spent it for?

Mr. WATSON. And I can get you the exact numbers for the record on that. As I recall, it is over \$12 billion in climate change-related technologies, clean technologies which not only benefit the climate but also get at the pollution issue which Mr. Manzullo and Rohrabacher addressed.

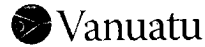
We also spent a significant amount—probably not quite that much or maybe at the same order and magnitude of climate change science side. We have proposed, of course, a number of tax incentives, which is running again in the neighborhood of several billion dollars, to encourage people to buy cleaner autos, take on—and businesses to take on more energy efficient technology and so on.

And internationally, there is well over \$1 billion that has been spent in our international programs, primarily with USAID, which engages, of course, developing countries around the world trying to introduce clean energy technologies.

[The information referred to follows:]



**MILLENNIUM
CHALLENGE
CORPORATION**



Compact-Eligible Country Report * June 2007

Compact Goal

The five-year, \$65.69 million Compact addresses improvements of the country's transportation infrastructure. Consisting of eleven infrastructure projects—including roads, wharfs, an airstrip and warehouses—the program aims to benefit poor, rural agricultural producers and providers of tourist related goods and services by reducing transportation costs and improving the reliability of access to transportation services.

Expected Results

The MCC program is expected to have a transformative impact on Vanuatu's economic development by increasing average income per capita by 15% within 5 years and directly impacting the lives of more than 65,000 poor, rural inhabitants. The Compact also includes institutional strengthening efforts and policy reform initiatives in Vanuatu's Public Works Department, namely: provision of plant and equipment for maintenance; introduction of service performance contracts; establishment of local community maintenance schemes; and introduction of user fees. These efforts aim to ensure the sustainable operation and maintenance of Vanuatu's entire transport infrastructure network, not only those assets built or rehabilitated with MCC funds.

Update on Progress

- On June 15, MCA-Vanuatu released the Invitation for Bid on Design and Construction of Compact transport infrastructure projects to short-listed firms.
- Vanuatu's 2007 National Budget contains a substantial increase (4.5 million USD) in the Public Works Department's budget for road maintenance. PWD has recently commenced maintenance preparation and strengthening activities in response to this funding increase.
- MCA-Vanuatu signed the contract for a Tourism Survey, which is expected to commence shortly. This survey will provide key baseline data indicators on tourism's contributions to income generation and employment, economic activity, and employment within Vanuatu. AusAid has signed a grant agreement with MCA-Vanuatu to provide funding in support of this effort.

Compact

Status..... Implementation, Year 2

Compact Information

Amount..... \$65.69 million

Duration..... 5 years

Country Information

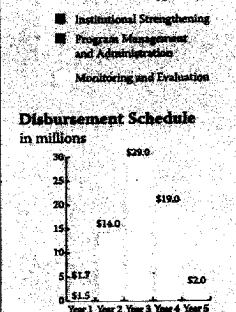
Population..... 207,331*

GNI Per Capita..... \$1,600*

Obligations by Key Sector in millions



Disbursement Schedule in millions



Projected Total Annual Disbursement

Total Disbursed to Date

*World Development Indicators, World Bank, 2005



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Vanuatu

Amount: \$65.69 million

Signed: Mar. 2, 2006

[Country Status Report](#)

Web Sites

- [Government](#)

Millennium Challenge Corporation has signed a five-year, \$65.69 million Compact with the Government of Vanuatu.

Vanuatu is a small island nation in the South Pacific comprised of 83 separate islands, where approximately half of the population lives in poverty. Costly and unreliable transportation is a major impediment to economic growth and poverty reduction in Vanuatu. As a small, open, island economy, agriculture and tourism are central to Vanuatu's growth. These two sectors together employ more than 70% of Vanuatu's working population and represent approximately 34% of Vanuatu's GDP.

The proposed five-year Compact program addresses the country's poor transportation infrastructure. Consisting of eleven infrastructure projects—including roads, wharfs, an airstrip and warehouses—the program aims to benefit poor, rural agricultural producers and providers of tourist related goods and services by reducing transportation costs and improving the reliability of access to transportation services.

The MCC program is expected to have a transformative impact on Vanuatu's economic development by increasing average income per capita by 15% within 5 years and directly impacting the lives of more than 65,000 poor, rural inhabitants—almost a third of the entire population.

Vanuatu's MCA program consists of two principal components:

1. Civil works for the reconstruction of priority transport infrastructure on eight islands, covering roads, wharfs, an airstrip, and warehouses; and
2. Institutional strengthening efforts and policy reform initiatives in Vanuatu's Public Works Department, including: provision of plant and equipment for maintenance; introduction of service performance contracts; establishment of local community maintenance schemes; and introduction of user fees. These efforts aim to ensure the sustainable operation and maintenance of Vanuatu's entire transport infrastructure network, not only those assets built or rehabilitated with MCC funds.

In developing its proposal for MCA assistance, Vanuatu utilized its Comprehensive Reform Program Summit, National Business Forum, and provincial Rural Economic Development Initiative (REDI) workshops to engage in a comprehensive consultative process with a broad segment of ni-Vanuatu

society, including: Vanuatu's council of chiefs, leaders of women's groups, the private sector, NGOs, church leaders, and local government officials from Vanuatu's provinces. The proposed projects were derived from each province's participatory Rural Economic Development Plan and received strong support from Vanuatu's donor community. To maintain public awareness and participation, the Government of Vanuatu has held MCA public outreach meetings in various provinces and engaged local media regarding proposal due diligence, project selection, and Compact development.

The Compact includes \$3.63 million for Program administration and audits. A comprehensive fiscal oversight and governance structure has been developed as part of the Compact to ensure maximum accountability for MCC funds, including the establishment of an accountable entity comprised of both government and non-governmental stakeholders. MCC has also retained approval rights over key agreements and implementation actions, e.g., selection of key service providers, certain payments, certain procurements, key personnel decisions for the accountable entity, detailed financial plans as well as the monitoring and evaluation plan.

In addition, the Compact provides \$1.37 million for Monitoring and Evaluation (M&E) activities, which includes support for data collection and reporting on economic and poverty impact indicators, and key implementation benchmarks for the civil works and maintenance project components.

Mr. FALEOMAVAEGA. What were some of those clean energy technologies we have spent \$1 billion helping other countries to develop?

Mr. WATSON. Well, there is a large emphasis for—one of the large emphases we have, particularly in the USAID program, is to try to get at their whole regulatory structure. And so there is a lot of, I would say, capacity building on helping different countries set up the right policies so it will help the introduction of more efficient renewable energy. There has been a lot of effort being put into renewable energy and helping folks try to do things like analyze where the best wind turbines, particularly a lot of work in the villages. India is an example to try to help the villages at the local level, again introduce renewable technologies wherever they are feasible.

There has been a tremendous amount of work on the ground, primarily through USAID, to move forward the clean energy agenda, which again has multiple benefits—economic development, poverty reduction as well as pollution reduction.

So there just is a myriad of things.

Now these, particularly the energy technologies, have benefits not only globally but also here at home. And the work that we are doing in clean coal technologies, for example, the work that we are continuing, the work we are doing in solar and renewables, spending there has been well over \$1 billion a year, are benefiting us not only at home but we are taking those lessons globally.

Mr. FALEOMAVAEGA. When you say technologies, does that mean a lot of these energy companies are getting these forms of subsidies to do R&D projects like coal?

Mr. WATSON. And, again, most of these are run by the Department of Energy through our Climate Change Technology Program, which actually involves 13 Federal agencies that are working in this area—probably 90-plus percent of that is the Department of Energy. And typically we have set up—there is obviously a lot of money that is going to the Federal laboratories. The Department

of Energy has places like Oak Ridge, Lawrence Berkeley Laboratory, and others working on basic research.

We also work hand-in-hand with the private sector setting up public-private partnerships. I guess some people could classify that as a subsidy, but we also think it is extraordinarily important to engage the private sector because they are going to put an element of reality into these.

Sometimes our scientists in the laboratories are a little isolated from the real world so it is very important to have folks that really know the business and know those technologies there and how to move those technologies in the marketplace are engaged.

Mr. FALEOMAVEGA. Another big issue that I think is going to be a part of our national debate is the question of nuclear energy. Big, big time, as you probably have seen the national media, the energy companies that are tied to our nuclear energy production capabilities. To suggest that it is clean energy, you don't have to worry about carbon emissions or greenhouse gasses; however, they do have what is known as nuclear waste.

And I am a little concerned since the time that we have had Three Mile Island problems, the problems with Chernobyl. I am probably the only member that has been to the nuclear test sites where we conducted our own nuclear testing program in the Marshall Islands. Literally blew one island out of shape. I mean just nonexistent.

I also visited Moruroa, where the French conducted their nuclear testing program. Not a good story how nuclearized this one whole island that is now unsafe for anybody to inhabit. And I visited Kazakhstan, where the Soviet Union conducted 500 nuclear devices the time when Kazakhstan was a province, and as a result of Soviet Union testing 1.5 million Kazakhs were exposed to nuclear contamination.

I am trying to give you—share with you the dark side of nuclear energy to suggest that it may not have any problems with carbon emissions. Right now our country still is in a debate over the question of: Why should the rest of our country send nuclear waste by-products to the State of Nevada in Yucca Mountain?

Can you tell me that it is possible and feasible to transport nuclear waste from all over the United States to Nevada, where they will be going through farm districts or downtown Denver, or whatever it is to the routes that these nuclear waste products are going to be transported, to the poor State of Nevada?

Has the administration given any thought to perhaps the idea that common sense would dictate if a State uses nuclear energy, it should also be responsible for taking care of its nuclear waste? Shouldn't that be a common sense approach? Why do we have to pick on Nevada to do this?

Mr. WATSON. Well, I mean, that was enshrined in legislation that goes back to the 1980s. And so that is basically, you know, the rules of the road right now.

I agree. I mean, there clearly—well, first of all, let me back up a moment. Nuclear energy is an important part of our energy mix. There is no doubt about it. Some 19 to 20 percent of our electricity, depending on the given year. So it is an important part of our energy mix. It has relatively zero carbon emissions.

Mr. FALEOMAVAEGA. And we haven't built a nuclear reactor in 20 years.

Mr. WATSON. I think TVA is about to bring one online which actually had been stopped back in the 1990s. But it is true we have not had a new nuclear reactor since the 1990s and others were suspended after Three Mile Island and after additional safety requirements came in and drove up the cost so they were no longer economic.

But I think there is—since Three Mile Island, since Chernobyl, there has been a lot of emphasis on improving the safety and the efficiency of our existing fleet, and there has been some very promising research done. It is simply an option, particularly if you are concerned about carbon dioxide emissions and actually clean air because if you don't have nuclear, you are going to have to replace that power with something and that something is probably going to be coal in most cases.

So clearly there are issues of concern. Nuclear waste is one. Clearly the threat of proliferation. But those are being—have been worked on extensively internationally and, again, we have great confidence that safe nuclear power can be used.

Mr. FALEOMAVAEGA. One of the issues that was raised during the negotiations of the Kyoto Protocol in the mid-1990s, it was pretty much the consensus of most of the nations, including our own country, that voluntary efforts to lesson carbon emissions was just not functional. It is just not possible to work in any practical form. And yet this seems to be the administration's number one emphasis: Do it on a voluntary basis. No required mandates as far as emissions are concerned.

Is that still the position of this administration?

Mr. WATSON. We have quite a few mandates, you know, ongoing. We have increased CAFE standards on light trucks and even SUVs, something in the order of 10 to 15 percent. That has happened a couple of times. We certainly have a number of mandates in the Energy Policy Act and prior energy legislation—a lot of mandates on appliances.

So certainly we have a whole suite of, I would say, sticks. We also have some carrots in terms of tax incentives and loan guarantees which are also contained in the Energy Policy Act of 2005, and I have a number of those that I referred to in my testimony.

But I think you also, if you look at programs, and, again, if you trust our EPA, our Environmental Protection Agency, which has the bulk of these, things like Climate Leaders, their domestic methane programs, their various partnerships like combined heat and power, their Green Power Partnership and so on. They have real measurable results. And those again are documented in my testimony.

So we believe, yes, you can on a voluntary basis get real results.

Mr. FALEOMAVAEGA. With all of the energy resources available to our country, could you give us a sense of priority in terms of what the administration considers to be its number one priority as an energy resource? Of course we know oil, we know gas. But would that be considered as our country's number one priority to make sure that we understand it, maintain it, make sure that we never lose it?

Mr. WATSON. I think certainly we need everything—we need everything that we have, but clearly I think we have often been called the Saudi Arabia of coal, for example. We are sitting on some 250 years of economically-recoverable coal, and if the price went up we would even have more. It is about 50 percent—we are about 50 percent reliant on coal for electricity.

And so that is why there has been a tremendous amount of focus on research on clean coal technologies and so on that will give us the ability to use that coal in an environmentally-friendly manner—that will not only get at the carbon dioxide, the greenhouse gas issue, but also the more traditional pollution, particulate matter, SOx/NOx, mercury and so on.

Mr. FALCOMA. I note with interest the administration's initiative about the Asia Pacific partnership and reducing greenhouse gas emissions. Were these done on a voluntary basis with these countries like Australia, India, Korea, and Japan? Or was this our initiative in asking these countries to participate?

Mr. WATSON. It was certainly done on a voluntary basis. These six countries have about over half the world's economy, about 45 percent of the world's energy population and about half of the world's energy use and greenhouse gas emissions. Also characteristic of these countries is the heavy reliance on coal for power generation. These countries, these set of six countries, both consume and produce about two-thirds of the world's coal. So we have very much in common in our energy structure.

It is also very important, of course, if we are ever going to internationally reach a global agreement within the Framework Convention on whatever the post-Kyoto regime looks like that we certainly engage China and India, and that is the real benefit. We do have these two at the table. They are very engaged in discussions on importance of technology. They know they have a problem. We also know that whether it is this administration, the next, or the next, any agreement that is ever going to be ratified and legislation implemented is going to have to include in some form the Chinas and the Indias.

Mr. FALCOMA. I note that it is well taken the fact that these six countries consume a tremendous amount of energy resources. But what about the 50 countries in the Asia Pacific region like Cambodia, Thailand, or Indonesia? Or some 20 island nations in the Pacific who have no means whatsoever to say that they know how to control because they didn't have problems with emission standards? Does the administration have any consideration what to do with those countries that don't have the means to control or even the fact that they don't even have the resources? They don't have oil. Except for solar, perhaps, and other means, but just don't have the economic ability to address these issues that countries like Australia or the United States or China and Japan are trying to resolve?

Mr. WATSON. Yes. And in most of those countries, most of those countries you mentioned USAID has active programs. So a lot of funding is going there. We also work through APEC, which engages the Pacific region. And, you know, there is an APEC Energy Working Group and so there is a lot of activity going on.

You know, with respect to the United States in engaging some of the smaller countries in the region, we really felt—and at some point, again, as we get the Asia-Pacific Partnership up and running, I am sure we will be looking to expanding membership. But you have to start somewhere. And we thought this grouping, again given it is large in everything, was an important place to start.

But we are certainly going to be expanding it in the future.

Mr. FALEOMAVAEGA. Do you think that maybe among the family of nations of some 190 countries that make up the United Nations rather than having 10 or 15 different regional organizations all having their own little thing to do, somewhat scattered about in doing their, whatever they are focusing on, do you think that maybe under the umbrella of the United Nations convention that we talked about since the 1992—establishing a framework so that all countries are inclusive in the process and not picking your own colleagues or your own friends at the expense of the others being left out. It seems to me that was the whole basis of the 1992 convention of the United Nations and climate change, was that the whole world should address it, which is the very thing that the President addressed in his presentation to the G-8 countries in May of this year. But it is nothing new. This is something that was already understood by the world community. This is not just a United States issue or a regional issue. This is a global issue.

Shouldn't all of these issues be within that framework of a global community-based activities or whatever it needs to do to address it rather than picking certain countries here and certain countries there? I am a little confused.

Mr. WATSON. Okay. Well, you know, the Framework Convention, as I am sure you know, Mr. Chairman, is very broad and encourages countries to work either individually or jointly together in trying to achieve the objective of the convention, and of course there are many different U.N. organizations themselves which can contribute to that. The U.N. Framework Convention on Climate Change is kind of the umbrella, but wherever you can work in, whether it is the United Nations Environment Program (UNEP), UNDP, you know, all different organizations can contribute to, again, to the goal of the convention.

It is an umbrella. It is a big tent where everybody contributes, whether it is APEC, which is a non-U.N. organization or the U.N. organizations themselves. They all come together under the big tent, the Framework Convention.

Mr. FALEOMAVAEGA. That was the very basis that caused some very major fractures, I suppose you might say, about our global economic efforts to say this is a global economy. And then it came to the point where the have-not countries versus have countries and the have countries controlling the whole agenda and everything. It seems to come to the same problem here that the countries that produce more energy or accumulate whatever it is that they do, what, 25 countries control 80 percent of the world's consumption and 70 percent of the world's population? I guess maybe I am being too idealistic to suggest that if one country hurts, all other countries should hurt the same. If all other countries hurt, everybody should be helping each other rather than the heck with

the rest as long as our little clique here is going okay with what we are doing.

But disregarding the needs and the interests of other countries that are less fortunate, less economically inclined, less capable of meeting those expectations, I note that you have—as one of the regional organizations called a group Under Earth Observations. You have about 60 countries participating in the process. What does it entail?

Mr. WATSON. It is basically to—it is to develop what is called the GEOSS, the Global Earth Observation System of Systems.

Mr. FALEOMAVAEGA. Are we currently using satellites?

Mr. WATSON. It is trying to tie together everything. We have everything from sub-surface sea to satellites and everything in between. And the idea, and we have a lot of the individual systems sitting out there, some are in better states of repair than others and various states of sophistication. But there is a whole myriad of what we really need and that is environmental data of which climate, of course, variables will be part of that. If we are really going to understand what is going on in the world environmentally, we really need to tie all of these sensors and different systems together. And that is really the purpose of this exercise.

We are working with the WMO, which is the World Meteorological Organization. In fact, the GEOSS Secretariat is housed within WMO—and, in fact, membership is open. We welcome—

Mr. FALEOMAVAEGA. What is the WMO?

Mr. WATSON. The World Meteorological Organization. It is based in Geneva. WMO membership is open to all Member States of the United Nations. I think it includes almost all of them. It is typically the metrological services, the weather services, of the different countries. Obviously they are interested in broadening beyond weather and also because they have all of those sensors sitting out there at the surface, land surface, sea surface, sea sub-surface out to the satellites. So there is a lot of data, a lot of information coming in, but often it is not in a useful form and some sets of data are better than others.

So the idea of this is to tie these systems together so that we can have quality data that are going to be made available to all free. I mean, that is the idea. And it will not only address climate change but will also have significance for hazard reduction. Obviously, you will be able to monitor—hopefully better monitor earthquakes or fires, you know, et cetera.

So it has a whole myriad of outputs in the data which should have wide societal benefits, of which being able to monitor the climate is one of them.

Mr. FALEOMAVAEGA. You are saying the technology is still being developed? It is not really state-of-the-art ability to observe?

Mr. WATSON. It depends upon—some of the systems. And there are major gaps in the world systems, particularly in the Southern Hemisphere. There is a lot of, as you know, being from that area, there is a lot of ocean there and very little land if you look at the globe from the bottom. So there are huge gaps, for example, in the Pacific region where you have vast regions of water. You also have gaps in some of the poorer countries of the world such as regions

such as Africa and some of the poor parts of Asia. And fairly big modern systems, obviously in the developed countries.

But part of this program also is to help countries get sensors so that they can be able to monitor their environment. So a tsunami is one example of that. We are trying to get better monitoring. So we will have early warning on tsunamis and other events that might occur.

Mr. FALEOMAVAEGA. My understanding is that right now our country has the capability through its satellite system, can spot to the inch format any place in this whole planet. Could that be used as part of the observation system where—why, there is tremendous interest among the 60 nations of the world that they could. I don't want to call it a spy satellite, but the fact that we can target any place in the world for these satellites' capability and say exactly what is out there to the inch, it is amazing. And I was just wondering.

Is GEOSS trying to develop the same kind of technology? Not just tsunamis, fires, earthquakes, hurricanes, cyclones, typhoons?

Mr. WATSON. The idea is not so much as to develop the satellites on their own but rather—I mean, countries and groups of countries are developing a myriad of observational systems, satellite systems. I mean, many, many countries are getting into the satellite launch business. But the idea, of course, is to tie these together so you can essentially have a seamless access to the data that is being generated.

Again, making sure there are safeguards, for part of the data that is coming out of that may have classified purposes. But to the extent that you could make available unclassified data available to all, particularly if it has relevance to environmental issues, is really the goal.

Mr. FALEOMAVAEGA. You said something about the ocean. I have a deep appreciation of what the ocean is like. I sailed on a Polynesian voyage canoe from Tahiti to Hawaii using non-instrument navigation, and yes, I do have a very deep appreciation and value and treasure very much the ocean, but I am concerned about these 23 little island nations that cover one-third of the Earth's surface. One of these island nations is sinking.

Do you think our country might be able to help a little country like Vanuatu that is only about three or four feet above sea level and every year because of climate change these atolls may no longer exist. Is there something that our country can do to help these people?

Mr. WATSON. Well, I know specifically within Vanuatu they recently became eligible—and again, I can get the data for you—I know for participation in the Millennium Challenge Corporation activities. And again, I will get you that for the record what the amount of money—I know there is a significant amount of money attached to that.

Again, in terms of that region, I know our Department of Interior does a lot of work particularly on economic development in those regions. So there is a lot of concern.

Some islands are sinking, of course, and some are not sinking. But obviously you have the sea level, you know, the sea level issue which is, of course, projected to get worse.

So that is one of the emphases. The whole adaptation issue is an issue which is putting increased focus on and, in fact, is one of the—in the President's speech of May 31st he highlighted the importance of making progress on that issue.

[The information referred to follows:]

Federal Climate Change Expenditures
Report to Congress

May 2007

APPENDIX C

Table 9

ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES BY AGENCY

Details by Agency/Account

(Tax expenditures and Budget authority, obligations, and outlays in millions of dollars)

The following is a listing of Federal climate change expenditures by agency and by line item in the President's 2008 Budget Appendix. Budget Appendix line items show account level data and may not reflect sub-account level climate change information. The data in this table may be subsets of an account.

	2008 Authority Available	2008 Authority Obligated	2008 Authority Unobligated	2008 Authority Total	2008 Authority Total	Change in Budget Authority
Department of Agriculture						
Climate Change Science Program						
Agricultural Research Service	38	34	35	35	32	-3
Cooperative State Research, Education and Extension Services	4	4	4	4	6	1
Economic Research Service	0	0	0	0	0	0
Forest Service -- Forest and Rangeland Research	18	19	19	19	19	0
USDA Climate Change Science Program Subtotal²	61	58	58	58	56	-2
Climate Change Research Initiative¹						
Agricultural Research Service	2	2	2	2	2	0
Forest Service - Forest and Rangeland Research	6	7	7	7	7	0
USDA Climate Change Research Initiative Subtotal²	8	8	8	8	8	0
Climate Change Technology Program						
Natural Resources Conservation Service -- Carbon Cycle	1	1	1	1	1	0
Forest Service R&D -- Inventories of Carbon Biomass	1	1	1	1	1	0
Agricultural Research Service -- Bioenergy Research	2	2	2	2	5	3

	FY 2008 Actual Budget Authority	FY 2007 Revised Budget Authority	FY 2007 Revised Budget Authority	FY 2007 Revised Budget Authority	FY 2008 President Budget Authority	Change in Budget Authority 2007-08
Cooperative State Research, Education and Extension Service – Biofuels/Biomass Research, Formula Funds, National Research Initiative	3	3	4	4	32	29
Forest Service – Biofuels/Biomass, Forest and Rangeland Research	2	2	2	2	5	3
Rural Business Service – Renewable Energy Program	23	23	23	23	34	11
Rural Business Service – Value Added Producer Grants	3	3	3	3	5	2
Rural Business Service – Biomass R&D, Section 9008 Farm Bill	14	12	12	12	0	-12
Office of the Chief Economist - Methane to Markets	0	0	0	0	1	1
Research Education, Economics Area - Bioenergy and Biobased Products Research Initiative (mandatory funding)	---	---	---	---	50	50
Forest Service - Forest Wood to Energy (mandatory funding)	---	---	---	---	15	15
Rural Business Service – Renewable Energy Systems and Energy Efficiency Grants (mandatory funding)	---	---	---	---	50	50
Rural Business Service – Renewable Energy Systems and Energy Efficiency Loans (mandatory funding)	---	---	---	---	21	21
Rural Business Service - Biomass R&D, Section 9008 (mandatory funding)	---	---	---	---	15	15
Subtotal - mandatory funding ²	---	---	---	---	151	151
Subtotal - discretionary funding ²	49	46	47	47	83	37
USDA Climate Change Technology Program Subtotal²	49	46	47	47	233.5	188
Total – USDA²	110	104	105	105	290	186
Department of Commerce						
Climate Change Science Program						
National Oceanic and Atmospheric Administration – Operations, Research, and Facilities	226	229	229	229	233	4
National Oceanic and Atmospheric Administration – Procurement, Acquisition, and Construction	9	7	7	7	7	0
National Institute of Standards and Technology (NIST)	---	---	---	---	5	5
DOC Climate Change Science Program Subtotal²	235	236	236	236	245	9

	2003	2004	2005	2006	2007	2008
Climate Change Research Initiative¹						
National Oceanic and Atmospheric Administration – Operations, Research, and Facilities	34	46	46	46	46	0
Climate Change Technology Program						
National Institute of Standards and Technology (NIST) – Scientific and Technological Research and Services	8	8	8	8	8	0
NIST – Industrial Technical Services, Advanced Technology Program	10	0	0	0	0	0
International Trade Administration – Operations and Administration	0	0	0	0	2	2
Climate Change Technology Program Subtotal²	18	8	8	8	10	2
Total – Commerce²	253	244	244	244	255	11
Department of Defense						
Climate Change Technology Program						
Research, Development, Test and Evaluation, Army	49	48	21	31	17	-31
Research, Development, Test and Evaluation, Navy	17	17	17	17	16	-1
Research, Development, Test and Evaluation, Air Force	0	0	0	0	0	0
Research, Development, Test and Evaluation, Defense-wide – DARPA	7	6	6	7	0	-6
Research, Development, Test and Evaluation, Defense-wide – Office of the Secretary of Defense	4	0	0	2	0	0
Total – DOD²	77	72	45	57	33	-39
Department of Energy						
Climate Change Science Program						
Science – Biological & Environmental Research	130	127	127	127	130	3
Climate Change Research Initiative³						
Science – Biological & Environmental Research	28	24	24	24	24	0
Climate Change Technology Program						
Energy Supply and Conservation – Energy Efficiency and Renewable Energy	1,166	1,411	1,411	1,316	1,236	-175

	FY 2006 Actual Authority	FY 2006 Actual Expenditure	FY 2006 Available Appropriation	FY 2006 Available Discretionary	FY 2006 Program Account Authority	FY 2006 Program Account Expenditure
Energy Supply and Conservation – Electricity Transmission and Distribution	77	111	95	44	106	-6
Energy Supply and Conservation – Nuclear	343	492	493	627	791	299
Fossil Energy R&D – Efficiency and Sequestration	397	508	392	359	539	31
Science – Fusion, Sequestration, and Hydrogen	391	501	501	501	709	208
Innovative Technology Loan Guarantee Program	0	7	7	6	0	-7
Departmental Administration – Climate Change Technology Program Direction	0	1	1	1	1	1
DOE Climate Change Technology Program Subtotal²	2,374	3,031	2,900	2,853	3,382	351
<i>National Climate Change Technology Initiative³</i>						
<i>Energy Supply and Conservation – Energy Efficiency and Renewable Energy</i>	66	118	117	87	115	-2
<i>Energy Supply and Conservation – Nuclear</i>	102	187	186	136	418	231
<i>Fossil Energy R&D – Efficiency and Sequestration</i>	121	163	157	114	139	-25
<i>Departmental Administration – Climate Change Technology Program Direction</i>	0	1	1	1	1	1
DOE National Climate Change Technology Initiative Subtotal²	289	468	461	338	673	204
Total – DOE²	2,504	3,158	3,026	2,980	3,511	354
<u>Department of Health and Human Services</u>						
Climate Change Science Program						
National Institutes of Health	50	50	50	49	49	-1
Total – HHS²	50	50	50	49	49	-1
<u>Department of the Interior</u>						
Climate Change Science Program						
U.S. Geological Survey – Surveys, Investigations, and Research	27	26	26	26	27	1
Total – DOI²	27	26	26	26	27	1
<u>Department of State</u>						
International Assistance						
Diplomatic and Consular Affairs	---	3	3	3	4	1
Economic Support Fund	6	32	32	32	32	0
International Organizations and Programs	6	6	6	6	5	-1

	PT 2000 Climate Science Authority	PT 2002 Climate Science Authority	PT 2007 Climate Science Authority	PT 2008 Climate Science Authority	PT 2009 Climate Science Authority	Climate Science Authority 2010-11
State International Assistance Subtotal¹	12	41	41	41	41	0
<u>Total – State²</u>	12	41	41	41	41	0
<u>Department of Transportation</u>						
Climate Change Science Program						
Federal Highway Administration – Federal-Aid Highways	0	0	0	0	1	0
Federal Aviation Administration – Research, Engineering, and Development	0	0	0	0	1	0
Federal Transit Administration - Research and University Research Centers	0	0	0	0	0	0
DOT Climate Change Science Program Subtotal¹	1	1	1	1	1	0
Climate Change Research Initiative²						
Federal Highway Administration – Federal-aid Highways	0	0	0	0	1	0
DOT Climate Change Research Initiative Subtotal²	0	0	0	0	1	0
Climate Change Technology Program						
National Highway Traffic Safety Administration Research and Innovative Technology Administration - Research and Development	1	1	1	1	1	0
Federal Transit Administration - Research and University Research Centers and Formula and Bus Grants	14	16	15	10	15	-1
DOT Climate Change Technology Program Subtotal¹	16	17	16	11	16	-1
<u>Total – DOT²</u>	17	18	17	12	17	0
<u>Department of the Treasury</u>						
International Assistance						
Debt Restructuring – Tropical Forestry Conservation	19.8	20	20	20	20	0
Global Environment Facility	26.4	26	26	19	36	9
<u>Total – Treasury¹</u>	46	46	46	39	56	9
<u>Environmental Protection Agency</u>						
Climate Change Science Program						
Science and Technology	19	16	16	16	17	1

	FF 2000 Climate Program Authority	FF 1997 Climate Program Authority	FF 1992 Climate Program Authority	FF 1987 Climate Program Authority	FF 1982 Climate Program Authority	Change in Authority Total
Climate Change Technology Program						
Environmental Programs and Management	90	92	92	92	88	-4
Science and Technology	19	13	13	13	13	0
EPA Climate Change Technology Program						
Subtotal²	109	105	105	105	101	-4
 National Climate Change Technology Initiative³						
<i>Environmental Programs and Management - Methane Programs</i>	<i>10</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>13</i>	<i>0</i>
Total - EPA²	128	121	121	121	118	-4
 National Aeronautics and Space Administration						
Climate Change Science Program						
Science, Aeronautics, and Exploration	953	1,083	1,160	1,280	1,084	0
Climate Change Research Initiative³						
<i>Science, Aeronautics, and Exploration</i>	<i>95</i>	<i>129</i>	<i>138</i>	<i>152</i>	<i>76</i>	<i>-53</i>
Climate Change Technology Program						
Science, Aeronautics, and Exploration	129	140	134	119	119	-21
Total - NASA¹	1,082	1,224	1,294	1,399	1,203	-21
 National Science Foundation						
Climate Change Science Program						
Research and Related Activities	197	205	205	205	208	3
Climate Change Research Initiative³						
<i>Research and Related Activities</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>25</i>	<i>0</i>
Climate Change Technology Program						
Research and Related Activities	18	21	21	21	22	1
Total - NSF²	215	226	226	226	231	5
 Smithsonian Institution						
Climate Change Science Program						
Salaries and Expenses	6	6	6	6	6	0
Total - Smithsonian²	6	6	6	6	6	0

	FY 2008 Total Authority	FY 2007 Total Authority	FY 2006 Total Authority	FY 2005 Total Authority	FY 2004 Total Authority	Change in Authority 2008
U.S. Agency for International Development						
Climate Change Science Program						
Development Assistance	13	14	14	14	13	-1
Climate Change Research Initiative³						
Development Assistance	13	14	14	14	13	-1
International Assistance						
Andean Counterdrug Initiative	0	0	0	0	0	0
Assistance for Eastern Europe and the Baltic States	6	3	3	3	11	8
Assistance for the Independent States of the Former Soviet Union	30	5	5	5	15	9
Development Assistance	118	89	89	89	81	-9
Economic Support Fund	33	0	0	0	7	6
International Disaster Assistance	2	2	2	2	2	0
P.L.-480 Title II Food Aid	1	0	0	0	0	0
USAID International Assistance Subtotal²	190	100	100	100	115	15
Total - USAID^{2,4}	190	100	100	100	115	15
Total - ALL AGENCIES FUNDING²						
	4,716	5,436	5,349	5,406	5,951	515
Energy Tax Provisions That May Reduce Greenhouse Gases⁵						
	1,160	1,730	1,730	1,730	1,420	-310
Total - ALL AGENCIES FUNDING + TAX PROVISIONS⁵						
	5,876	7,166	7,079	7,136	7,371	205

¹ All obligation and outlay data are preliminary full year estimates and are subject to change.

² Subtotals and totals may not add due to rounding. Data supersede numbers released with the President's 2008 Budget. Discrepancies resulted from rounding and improved estimates.

³ The Climate Change Research Initiative (CCRI) and the National Climate Change Technology Initiative (NCCTI) are subsets of the overall Climate Change Science Program and Climate Change Technology Programs respectively; all CCRI and NCCTI lines are non-add lines.

⁴ The International Assistance subtotal for USAID contains funds that are also counted in USAID's Climate Change Science Program subtotal. Agency total line excludes this double-count.

⁵ Tax expenditures are estimates of the revenue losses due to a tax preference. While not exactly equivalent to budget authority, obligations or outlays, tax expenditure estimates have been included in all columns for completeness.

Federal Climate Change Expenditures **Report to Congress**

April 2006

APPENDIX C

Table 9

ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES BY AGENCY

Details by Agency/Account

(Tax expenditures and discretionary budget authority, obligations, and outlays in millions of dollars)

The following is a listing of Federal climate change expenditures by agency and by line item in the President's 2007 Budget Appendix. Budget Appendix line items show account level data and may not reflect sub-account level climate change information. The data in this table may be subsets of an account.

	FY 2005 Actual Budget Authority	FY 2006 Enacted Budget Authority	FY 2006 Obligations ¹	FY 2006 Outlays ¹	FY 2007 Proposed Budget Authority	Δ Change, Budget Authority 2006-07
<u>Department of Agriculture</u>						
Climate Change Science Program						
Agricultural Research Service	38	38	38	38	36	-2
Cooperative State Research, Education and Extension Services	5	5	5	5	6	0
Economic Research Service	0	0	0	0	0	0
Forest Service – Forest and Rangeland Research	18	18	18	18	19	1
USDA Climate Change Science Program Subtotal²	62	62	62	62	60	-1
<i>Climate Change Research Initiative³</i>						
<i>Agricultural Research Service</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>2</i>	<i>5</i>	<i>3</i>
<i>Forest Service - Forest and Rangeland Research</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>6</i>	<i>7</i>	<i>1</i>
<i>USDA Climate Change Research Initiative Subtotal²</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>8</i>	<i>11</i>	<i>4</i>
Climate Change Technology Program						
Natural Resources Conservation Service – Biomass R&D, Farm Bill Section 9008	13	12	12	12	12	0
Natural Resources Conservation Service – Carbon Cycle	1	1	1	1	1	0
Forest Service R&D – Inventories of Carbon Biomass	1	1	1	1	1	0
Agricultural Research Service – Bioenergy Research	2	2	2	2	2	0

	FY 2005 Actual Budget Authority	FY 2006 Enacted Budget Authority	FY 2006 Obligations ¹	FY 2006 ¹ Outlays ¹	FY 2007 Proposed Budget Authority	\$ Change, Budget Authority 2006-07
USDA, continued						
Cooperative State Research, Education and Extension Service – Biofuels/Biomass Research, Formula Funds, National Research Initiative	5	5	5	3	3	-1
Forest Service – Biofuels/Biomass, Forest and Rangeland Research	2	2	2	2	3	0
Rural Business Service – Renewable Energy Program ⁴	23	23	23	23	10	-13
Rural Business Service – Value Added Producer Grants ⁵	2	3	3	3	3	0
USDA Climate Change Technology Program Subtotal²	48	48	48	46	34	-13
Total – USDA²	110	109	109	108	95	-15
Department of Commerce						
Climate Change Science Program						
National Oceanic and Atmospheric Administration – Operations, Research, and Facilities	120	151	151	151	173	22
<i>Climate Change Research Initiative³</i>						
<i>National Oceanic and Atmospheric Administration – Operations, Research, and Facilities</i>	<i>46</i>	<i>34</i>	<i>34</i>	<i>34</i>	<i>46</i>	<i>12</i>
Climate Change Technology Program						
National Institute of Standards and Technology (NIST) – Scientific and Technological Research and Services	8	7	7	7	7	0
NIST – Industrial Technical Services, Advanced Technology Program ⁶	18	10	10	10	0	-10
International Trade Administration – Operations and Administration ⁷	0	0	0	0	2	2
DOC Climate Change Technology Program Subtotal²	26	17	17	17	9	-8
Total – Commerce²	146	168	168	168	182	14
Department of Defense⁸						
Climate Change Technology Program						
Research, Development, Test and Evaluation, Army	27	37	36	33	6	-31
Research, Development, Test and Evaluation, Navy	18	23	23	21	7	-17
Research, Development, Test and Evaluation, Air Force	1	0	0	0	0	0
Research, Development, Test and Evaluation, Defense-wide – DARPA	11	7	8	10	3	-4

	FY 2005 Actual Budget Authority	FY 2006 Enacted Budget Authority	FY 2006 Obligations ¹	FY 2006 Outlays ¹	FY 2007 Proposed Budget Authority	\$ Change, Budget Authority 2006-07
<u>DOD, continued</u>						
Research, Development, Test and Evaluation, Defense-wide – Office of the Secretary of Defense	2	4	3	3	0	-4
<u>Total – DOD²</u>	59	71	70	66	15	-55
<u>Department of Energy⁹</u>						
Climate Change Science Program						
Science – Biological & Environmental Research	127	131	131	131	126	-4
<i>Climate Change Research Initiative³</i>						
Science – Biological & Environmental Research	25	25	25	25	24	-2
Climate Change Technology Program						
Energy Supply and Conservation – Energy Efficiency and Renewable Energy ^{10,11}	1,234	1,174	1,174	1,208	1,176	2
Energy Supply and Conservation – Electricity Transmission and Distribution	57	73	73	62	100	27
Energy Supply and Conservation – Nuclear ¹²	291	333	339	442	463	131
Fossil Energy R&D – Efficiency and Sequestration ¹³	374	405	537	353	419	15
Science – Fusion, Sequestration, and Hydrogen	386	423	423	420	551	129
Departmental Administration – Climate Change Technology Program Direction ¹⁴	0	0	0	0	1	1
DOE Climate Change Technology Program Subtotal¹	2,342	2,407	2,545	2,486	2,711	305
<i>National Climate Change Technology Initiative³</i>						
Energy Supply and Conservation – Energy Efficiency and Renewable Energy	65	62	62	61	113	51
Energy Supply and Conservation – Nuclear	9	30	30	34	44	14
Fossil Energy R&D – Efficiency and Sequestration ¹⁵	89	122	122	102	134	12
Departmental Administration – Climate Change Technology Program Direction	0	0	0	0	1	1
DOE National Climate Change Technology Initiative Subtotal²	162	214	214	198	292	77
<u>Total – DOE²</u>	2,469	2,537	2,676	2,616	2,838	301
<u>Department of Health and Human Services</u>						
Climate Change Science Program						
National Institutes of Health	57	57	57	55	57	0
<u>Total – HHS²</u>	57	57	57	55	57	0

	FY 2005 Actual Budget Authority	FY 2006 Enacted Budget Authority	FY 2006 Obligations ¹	FY 2006 Outlays ¹	FY 2007 Proposed Budget Authority	\$ Change, Budget Authority 2006-07
Department of the Interior						
Climate Change Science Program						
U.S. Geological Survey – Surveys, Investigations, and Research	27	27	27	27	26	-1
Climate Change Technology Program						
US Geological Survey – Surveys, Investigations and Research, Geology Discipline, Energy Program ¹⁶	2	0	0	0	0	0
Total – DOI²	29	27	27	27	26	-1
Department of State						
International Assistance						
Diplomatic and Consular Affairs ¹⁷	0	0	0	0	4	4
Economic Support Fund ¹⁸	1	6	6	1	32	26
International Organizations and Programs	6	6	6	6	5	-1
State International Assistance Subtotal²	7	12	12	7	41	29
Total – State²	7	12	12	7	41	29
Department of Transportation						
Climate Change Science Program						
Federal Highway Administration – Federal- Aid Highways	1	1	1	1	1	0
Federal Aviation Administration – Research, Engineering, and Development ¹⁹	0	0	0	0	0	0
DOT Climate Change Science Program Subtotal²	1	1	1	1	1	0
Climate Change Research Initiative²						
Federal Highway Administration – Federal- aid Highways	1	1	1	1	1	0
Federal Aviation Administration – Research, Engineering, and Development ¹⁹	0	0	0	0	0	0
DOT Climate Change Research Initiative Subtotal²	1	1	1	1	1	0
Climate Change Technology Program						
Office of the Secretary of Technology - Transportation, Policy, Research and Development ²⁰	1	0	0	0	0	0
National Highway Traffic Safety Administration ²¹	0	0	0	0	0	0
Research and Innovative Technology Administration - Research and Development ²²	1	0	1	1	1	0
DOT Climate Change Technology Program Subtotal²	2	0	1	1	1	0
Total – DOT²	3	1	2	2	2	1

	FY 2005 Actual Budget Authority	FY 2006 Enacted Budget Authority	FY 2006 Obligations ¹	FY 2006 Outlays ¹	FY 2007 Proposed Budget Authority	\$ Change, Budget Authority 2006-07
<u>Department of the Treasury</u>						
International Assistance						
Debt Restructuring – Tropical Forestry Conservation ²³	20	20	20	20	8	-12
Global Environment Facility ²⁴	24	18	18	17	17	-1
Asian Development Bank ²⁵	0	0	0	0	7	7
Total – Treasury²	44	38	38	36	32	-6
<u>Environmental Protection Agency</u>						
Climate Change Science Program						
Science and Technology	20	19	19	19	18	-1
Climate Change Technology Program						
Environmental Programs and Management Science and Technology	91	90	90	90	92	2
EPA Climate Change Technology Program Subtotal ³	110	109	109	109	105	-4
National Climate Change Technology Initiative³						
Environmental Programs and Management	11	12	12	12	15	3
Total – EPA²	130	128	128	128	123	-5
<u>National Aeronautics and Space Administration²⁶</u>						
Climate Change Science Program^{27,28}						
Science, Aeronautics, and Exploration	1,241	1,045	1,312	1,283	1,029	-17
Climate Change Research Initiative^{3,27}						
Science, Aeronautics, and Exploration	94	97	74	56	86	-12
Climate Change Technology Program²⁹						
Science, Aeronautics, and Exploration	208	104	102	100	86	-19
Total – NASA²	1,449	1,150	1,414	1,384	1,114	-35
<u>National Science Foundation</u>						
Climate Change Science Program						
Research and Related Activities	198	197	197	197	205	8
Climate Change Research Initiative³						
Research and Related Activities	25	25	25	25	25	0
Climate Change Technology Program						
Research and Related Activities	11	18	18	18	19	1
Total – NSF²	209	215	215	215	224	9
<u>Smithsonian Institution</u>						
Climate Change Science Program						
Salaries and Expenses	6	6	6	6	6	0
Total – Smithsonian²	6	6	6	6	6	0

	FY 2005 Actual Budget Authority	FY 2006 Enacted Budget Authority	FY 2006 Obligations ¹	FY 2006 Outlays ¹	FY 2007 Proposed Budget Authority	\$ Change, Budget Authority 2006-07
U.S. Agency for International Development						
Climate Change Science Program³⁰						
Development Assistance	6	13	13	3	14	1
<i>Climate Change Research Initiative^{3,30}</i>						
Development Assistance	6	13	13	3	14	1
International Assistance						
Andean Counterdrug Initiative ³¹	2	1	1	1	0	-1
Assistance for Eastern Europe and the Baltic States	5	6	6	4	3	-4
Assistance for the Independent States of the Former Soviet Union	34	30	30	33	25	-5
Development Assistance	134	118	118	98	110	-8
Economic Support Fund	5	33	33	9	6	-27
International Disaster Assistance	2	2	2	1	2	0
P.L.-480 Title II Food Aid	1	1	1	1	1	0
USAID International Assistance Subtotal²	183	192	192	148	147	-45
Total – USAID^{2,32}	183	192	192	148	147	-45
TOTAL - ALL AGENCIES, DISCRETIONARY FUNDING²	4,900	4,710	5,112	4,964	4,901	191
Energy Tax Provisions That May Reduce Greenhouse Gases	369	1,084	1,084	1,084	1,607	523
TOTAL - ALL AGENCIES, DISCRETIONARY FUNDING + TAX PROVISIONS²	5,269	5,794	6,196	6,048	6,508	714

¹ All obligation and outlay data are preliminary full year estimates and are subject to change.

² Subtotals and totals may not add due to rounding. Data supersede numbers released with the President's 2007 Budget. Discrepancies resulted from rounding and improved estimates.

³ The Climate Change Research Initiative (CCRI) and the National Climate Change Technology Initiative (NCCTI) are subsets of the overall Climate Change Science Program and Climate Change Technology Programs respectively; all CCRI and NCCTI lines are non-add lines.

⁴ Funding for loans and grants to small farmer and ranchers for the purchase of renewable energy systems and for making energy efficiency improvements is also provided through other state and Federal programs. The 2007 Budget request reduces funding to address this duplication.

⁵ Value Added Producer Grants for renewable energy should have been reported as part of the CCTP since the formalization of the CCTP in 2003. In addition, the 2006 and 2007 funding levels are preliminary estimates that will be revised once the competitive grant process is complete.

⁶ The 2007 President's Budget proposes termination of NIST's Advanced Technology Program.

⁷ The Department of Commerce will provide funding in this account for the new Asia-Pacific Partnership on Clean Development and Climate beginning in 2007. No climate-related funding has been included in this account in past years.

⁸ The reduction in 2007 budget authority is due to the exclusion of Congressional earmarks in the President's Budget that are included in the 2005 and 2006 funding levels shown.

⁹ The 2007 Budget for DOE's CCTP contribution reflects the planned ramp-up in the International Thermonuclear Experimental Reactor project and increases for existing basic research efforts that are relevant to hydrogen, solar

energy, and nuclear energy technologies. In addition, the 2007 Budget reflects an increase in funding for Advanced Fuel Cycle Initiative specifically to support the Global Nuclear Energy Partnership.

- ¹⁰ In 2006, Congress merged the Energy Supply and Energy Conservation accounts to create the Energy Supply and Conservation account. The new account structure is presented in the FY 2007 President's Budget Appendix. The amount reported under the Energy Efficiency and Renewable Energy line within this account reflects a combined total of the Energy Conservation line item and the former Energy Supply - Renewables line item that had been presented in prior reports.
- ¹¹ The increase for Energy Efficiency and Renewable Energy in the 2007 Budget reflects increased emphasis in two key technology areas: wind power for low-wind speed environments and Biochemical Platform R&D to help reduce costs of cellulosic ethanol (ethanol produced from agricultural waste, forest residues, and bioenergy crops). The increases are for ongoing activities, not new programs.
- ¹² The infrastructure elements of the 2005, 2006, and 2007 Nuclear funding include only infrastructure that directly supports CCTP RD&D and CCTP deployment. The reduced infrastructure reporting adheres more closely to the CCTP climate change criteria. Data presented in past reports do not reflect this corrected reporting.
- ¹³ Obligations and outlays for Fossil Energy R&D activities assume spending a significantly higher proportion of unobligated balances in 2006 than has occurred over the last several years. DOE assumes that Fossil Energy R&D will reduce its unobligated balances by \$158 million (26%) between the beginning of 2006 and the beginning of 2007.
- ¹⁴ In 2005, \$1.5 million was provided for CCTP program direction within DOE's Energy Efficiency and Renewable Energy program direction allocation.
- ¹⁵ The increase in funding for Fossil Energy activities within NCCTI from 2005 to 2006 represents a greater level of effort in ongoing Sequestration and Integrated Gasification Combined Cycle activities.
- ¹⁶ In 2005, USGS completed research to assess the sources of and potential geologic sequestration options for carbon dioxide. CCTP sequestration-related gas hydrate activities were also completed in 2005. Additional gas hydrate work is done at USGS, but the remaining work does not fit within the scope of CCTP.
- ¹⁷ The 2007 President's Budget request includes \$4 million in Diplomatic and Consular Affairs account to support the new Asia-Pacific Partnership on Clean Development and Climate. No climate funding has been included in this account in past years.
- ¹⁸ The 2007 President's Budget includes \$26 million in the Economic Support Fund for the new Asia-Pacific Partnership on Clean Development and Climate.
- ¹⁹ Funding for Federal Aviation Administration is less than \$500K in all years shown.
- ²⁰ The 2005 funding within the Office of the Secretary was the result of a Congressional earmark. No CCTP funding was included for the office in the 2006 appropriations or requested in the 2007 President's Budget.
- ²¹ Funding for the National Highway Transportation Safety Administration's is less than \$500K for all years shown.
- ²² Funding for the Research and Innovative Technology Administration - Research and Development is less than \$500K in 2006.
- ²³ The enacted level for the Tropical Forestry Conservation Act (TFCA) is \$20 million in 2005 and \$20 million in 2006. 2007, the Administration requested a total of \$182 million for debt restructuring programs to be available for: bilateral Heavily Indebted Poor Countries (HIPC) and poorest country debt reduction, contributions to the HIPC Trust Fund, and TFCA debt reduction. The Budget provides the Treasury Department flexibility in determining the amount for each program. The 2007 funding level for TFCA has not been determined yet, but it has been estimated that up to \$8 million may be available for TFCA in 2007.
- ²⁴ The 2007 Budget provides \$56 million for GEF and \$24 million for the Asian Development Bank (ADB). Approximately 30% of this funding will be allocated to programs related to climate change; this represents the lower bound of 2007 funding that will support climate change programs. The allocation of the climate funding between these two accounts is contingent upon the outcome of ongoing GEF-4 replenishment negotiations.
- ²⁵ The 2007 President's Budget request includes funding for climate-related activities through the Asian Development Bank, some of which may be used to support the Asia-Pacific Partnership. No climate-related funding has been included in this account in past years.
- ²⁶ NASA funding levels presented in this table do not reflect full cost accounting from 2006 onward.
- ²⁷ The decreases in NASA's CCSP and CCRI budget authority from 2006 to 2007 are due to changes in the agency's budget for space observing platforms reflecting the natural development cycle of its satellites as well as revisions to mission profiles.
- ²⁸ NASA's 2006 obligations and outlays for CCSP are projected to be higher than 2006 enacted budget authority due to the year-to-year spend-out rates associated with the satellite missions in development.
- ²⁹ The decrease in NASA's CCTP number in 2007 is due to realignment within its Aeronautics Research areas.

- ³⁰ Due to recent changes in CCSP/CCRI activities and priorities, additional ongoing activities in the Democracy, Conflict, and Humanitarian Assistance program are reported under CCSP and CCRI beginning in 2006.
- ³¹ The Andean Counterdrug Initiative account was added in the FY 2004 report to reflect new counter-deforestation activities in Peru.
- ³² The International Assistance subtotal for USAID contains funds that are also counted in USAID's Climate Change Science Program subtotal. Agency total line excludes this double-count.

GAO

United States Government Accountability Office
Report to Congressional Requesters

August 2005

CLIMATE CHANGE

Federal Reports on Climate Change Funding Should Be Clearer and More Complete



GAO-05-461

Appendix IV

Analysis of OMB Funding Report Accounts

Table 8: Analysis of OMB Funding Report Accounts, 1993-2004

Discretionary budget authority in millions of dollars												
Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
TECHNOLOGY												
Direct Technology:												
Department of Agriculture							0	0	3	3	42	45
Agricultural Research Service							0		0		2	2
Rural Business Service												
Renewable Energy Program										0	22	23
Forest Service												
Forest and Rangeland Research							0	0	3		1	0
Research and Development - Inventories of Carbon Biomass											1	0
Natural Resources Conservation Service							0					
Carbon Cycle											1	1
Biomass Research and Development										3	14	14
Cooperative State Research, Education and Extension Service												
Biofuels/Biomass research; Formula Funds, National Research Initiative											3	5
Department of Commerce												
National Institutes of Standards and Technology											40	28
Industrial Technical Services - Advanced Technology Program											30	18
Scientific and Technical Research Services							0	2			10	10
Department of Defense											83	51
Research, Development, Test and Evaluation, Army											45	15
Research, Development, Test and Evaluation, Navy											16	17
Research, Development, Test and Evaluation, Air Force											3	1

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Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Research, Development, Test and Evaluation, Defense-wide											19	19
Department of Energy	595	753	829	683	658	729	890	980	1,050	1,519	2,099	2,390
Energy Conservation										880	880	868
Energy Conservation Research and Development	348	435	468	415	414	457	518	577	619	622		
State Energy Grants										45		
Weatherization										230		
Energy Supply	249	318	361	268	244	272	332	315	375	400	607	730
Nuclear Energy Research Initiative										32		
Energy Supply/Electricity											88	73
Energy Supply/Renewables	249	318	361	268	244	272	332	310	370	366	322	352
Energy Supply/Nuclear							0	5	5		257	309
Fossil Energy Research and Development							24	52	18	164	253	455
Sequestration Research and Development										32		
Greenhouse Gas Emission Reduction										152		
Science							13	33	35	35	298	333
Sequestration										35		
Energy Information Administration							3	3	3	3		
Environmental Protection Agency	43	102	96	86	90	109	103	123	115	102	110	
Environmental Programs and Management	35	91	81	70	73	72	76	96	89	82	89	
Science and Technology	8	11	15	16	17	37	27	27	26	20	22	
Department of Housing and Urban Development												
Research and Technology							10	10				
Department of Interior											1	1
U.S. Geological Survey-Surveys, Investigations, and Research												
Geology Discipline, Energy Program											1	1

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Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
National Aeronautics and Space Administration												
Exploration, Science and Aeronautics											152	227
National Science Foundation												
Research and Related Activities											9	11
Department of Transportation											27	5
Federal Transit Administration												
Capital Investment Grants											26	
Office of the Secretary of Technology												
Transportation, Policy, Research and Development											1	4
Research and Innovative Technology Administration												
Research and Development											0	1
Direct Technology Total	\$595	\$755	\$531	\$772	\$744	\$818	\$1,009	\$1,095	\$1,176	\$1,637	\$2,555	\$2,868
Indirect Technology												
Department of Energy												
Fossil Energy Research and Development							351	417	434	499		
Coal - Efficient Combustion and Utilization								233	243	274		
Natural Gas - Efficient Combustion and Utilization												
Energy Supply												
Nuclear Energy Research and Development							0	18	22	34		
Energy Conservation Research and Development												
Weatherization and State Energy Grants							155	166	169	191		
Biobased Products and Bioenergy								195	200			
Department of Agriculture								86	76			
Agriculture Research Service								44	46			
Cooperative State Research, Education, and Extension Service												

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Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Research and Education Assistance							11	11				
Initiative for Future Agriculture and Food Systems								9				
Forest Service												
Forest and Rangeland Management							9	9				
Executive Operations							1	1				
Departmental Administration							*	*				
Alternative Agricultural Research and Commercialization							4					
Natural Resources Conservation Service												
Forestry Incentives Program							16					
Rural Development												
Rural Community Advancement Program							1					
Department of Energy							109	124				
Energy Supply												
Solar and Renewable Energy Research and Development							40	70				
Energy Conservation Research and Development							41	11				
Fossil Energy Research and Development							0	13				
Science (Basic Science)							27	30				
Partnership for a New Generation of Vehicles							73	64				
Department of Commerce			63	56	42	29	30	22				
Under Secretary for Technology/Office of Technology Policy							1	0				
Salaries and Expenses			0	1	1	1						
National Institutes of Standards and Technology							29	22				
Scientific and Technical Research and Services			7	7	7	6						
Industrial Technology Services			56	48	34	22						

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Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
National Science Foundation												
Research and Related Activities			53	53	56	47	40	42				
Department of Transportation												
National Highway Traffic Safety Administration												
Operations and Research			5	6	13	5	3					
Indirect Technology Total												
Technology Total										\$1,637	\$2,555	\$2,868
SCIENCE												
U.S. Global Change Research Program												
Department of Agriculture												
Agricultural Research Service	55	56	60	52	57	53	52	56	51	56	60	64
Cooperative State Research, Education, and Extension Services	17	18	24	24	26	27	26	28	29	30	35	36
Research and Education	11	12	10	10	12	7	7	9	4	9	8	16
Economic Research Service	1	1	1	1	1	1	1	1	1	1	0	0
Natural Resources Conservation Service												
Conservation Operations	2	2	2	2	1	1	1	1				
Forest Service												
Forest and Rangeland Research	24	23	23	15	17	17	17	17	17	17	17	12
Department of Commerce												
National Oceanic and Atmospheric Administration												
Operations, Research, and Facilities	56	63	57	57	50	60	63	67	93	100	96	82
Department of Energy												
Science (Biological and Environmental Research)	118	118	113	113	109	106	114	114	116	117	112	102
Environmental Protection Agency												
Science and Technology	26	30	22	18	13	13	17	21	23	21	22	17
Department of Health and Human Services												
National Institutes of Health					35	35	40	47	54	56	61	62

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Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
National Institute of Environmental Health Sciences						4						
National Eye Institutes						9						
National Cancer Institute						21						
National Institute of Arthritis and Musculoskeletal and Skin Diseases						*						
Department of the Interior												
U.S. Geological Survey												
Surveys, Investigations, and Research	22	29	27	26	26	26	27	27	27	26	28	28
National Aeronautics and Space Administration												
Science, Aeronautics, and Technology	888	999	1,305	1,218	1,218	1,210	1,155	1,161	1,176	1,090	1,144	1,256
National Science Foundation												
Research and Related Activities	124	142	169	163	166	167	182	187	181	189	188	185
Smithsonian Institution												
Salaries and Expenses	7	7	7	7	7	7	7	7	7	6	6	6
U.S. Agency for International Development												
Development Assistance										6	6	0
U.S. Global Change Research Program Total						\$1,677	\$1,657	\$1,687	\$1,728	\$1,667	\$1,725	\$1,803
Climate Change Research Initiative												
Department of Agriculture											2	6
Agricultural Research Service											0	1
Forest Service												
Forest and Rangeland Research											1	5
Department of Commerce												
National Oceanic and Atmospheric Administration												
Operations, Research, and Facilities											18	34
Department of Energy												
Science (Biological and Environmental Research)											3	27

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Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
National Science Foundation												
Research and Related Activities											15	30
National Aeronautics and Space Administration												
Science, Aeronautics, and Technology											3	65
Department of State												
International Organizations and Programs												1
Department of Transportation												4
Federal Highway Administration												
Federal Aid - Highways												4
U.S. Agency for International Development												
Development Assistance												6
Climate Change Research Initiative Total											\$41	\$173
Science Total	\$1,130	\$1,144	\$1,700	\$1,697	\$1,697	\$1,694	\$1,677	\$1,657	\$1,687	\$1,728	\$1,667	\$1,766
INTERNATIONAL ASSISTANCE												
Department of Energy							6					
Energy Supply												
Solar and Renewable Energy Research and Development							6					
Department of State												
International Organizations and Programs	1	1	1	3	3	5	7	7	7	7	6	5
Trade and Development Agency							16					
Department of the Treasury										43	56	52
International Development Assistance												
Global Environment Facility ²		12	35	14	14	18	60	14	41	38	56	32
Debt Restructuring												
Tropical Forest Conservation									13	5		20
U.S. Agency for International Development								156	157	174	208	195
Development Assistance	200	173	192	175	147	163	169	109	112	116	140	125
Development Credit Authority							1	1	1			

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(Continued From Previous Page)

Discretionary budget authority in millions of dollars

Account	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Economic Support Fund							19	8		12	6	9
Assistance for the Independent States of the Former Soviet Union							35	34	31	30	48	47
Assistance for Eastern Europe and the Baltic States							12	4	13	11	8	7
International Disaster Assistance										4	4	2
Andean Counterdrug Initiative											2	3
International Assistance Total	\$201	\$186	\$228	\$192	\$164	\$186	\$325	\$177	\$218	\$224	\$270	\$252
Tax Expenditures¹												
Total Climate Change Funding	\$201	\$186	\$228	\$192	\$164	\$186	\$3,114	\$3,535	\$3,511	\$3,603	\$3,522	\$4,584

Source: GAO Analysis of OMB Reports.

Notes:

GAO calculated the total for shaded cells based on OMB data presented in its reports. Blank cells indicate that OMB did not report a value for the account for that year.

¹OMB presented funding of less than \$500,000 for this account

²OMB did not distinguish between indirect and direct technology funding for this year.

³GEF funding as presented by OMB for each year represents the portion of total GEF funding that is related to climate change.

⁴OMB did not report revenue loss estimates for existing climate-related tax expenditures from 1993 through 2004.

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APPENDIX D

ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES BY AGENCY

By Appropriation Account/Line Item
(Budget authority and tax incentives in millions of dollars)

The following is a detailed listing of Federal climate change expenditures by agency with account level information as provided in the President's FY 2005 Budget Appendix. All numbers represent budget authority unless otherwise noted. The line items in the Program and Financing schedule in the Budget Appendix use obligations, not budget authority, so the numbers may not be comparable.

	FY 2003 Actual	FY 2004 Enacted	FY 2005 Proposed	\$ Change 2004-2005
Department of Agriculture				
Climate Change Science Program	62	65	71	6
Climate Change Technology Program	42	45	33	-12
Subtotal – USDA¹	104	110	105	-5
Department of Commerce				
Climate Change Science Program	116	123	142	19
Climate Change Technology Program	40	28	10	-18
Subtotal – DOC	156	151	152	1
Department of Defense				
Climate Change Technology Program	83	41	48	7
Department of Energy				
Climate Change Science Program	115	130	131	1
Climate Change Technology Program	2,099	2,408	2,557	148
Subtotal – DOE¹	2,214	2,538	2,687	149
Department of Health and Human Services				
Climate Change Science Program	61	63	65	2
Department of the Interior				
Climate Change Science Program	28	29	29	0
Climate Change Technology Program	1	1	1	0
Subtotal – DOI¹	28	30	30	0
Department of State				
Climate Change Science Program	0	1	1	0
International Assistance	6	6	6	0
Subtotal – State¹	6	7	7	0

Accounting of Federal Climate Change Expenditures By Agency - Continued

	FY 2003 Actual	FY 2004 Enacted	FY 2005 Proposed	\$ Change 2004-2005
Department of Transportation				
Climate Change Science Program	—	4	3	-1
Climate Change Technology Program	27	14	2	-13
Subtotal – DOT¹	27	18	5	-14
Department of the Treasury				
International Assistance	56	73	63	-9
Environmental Protection Agency				
Climate Change Science Program	22	21	21	0
Climate Change Technology Program	102	109	110	1
Subtotal – EPA¹	124	130	131	1
National Aeronautics and Space Administration				
Climate Change Science Program	1,147	1,334	1,271	-63
Climate Change Technology Program	152	221	209	-12
Subtotal – NASA¹	1,298	1,555	1,480	-75
National Science Foundation				
Climate Change Science Program	203	213	210	-3
Climate Change Technology Program	9	11	13	1
Subtotal – NSF¹	213	225	223	-2
Smithsonian Institution¹				
Climate Change Science Program	6	6	6	0
U.S. Agency for International Development				
Climate Change Science Program	6	6	6	0
International Assistance	208	181	160	-22
Subtotal – USAID^{1,2}	214	187	166	-22
Total – ALL AGENCIES¹	4,584	5,128	5,161	33
Energy Tax Incentives that Reduce Greenhouse Gases	0	0	680	680
Total – ALL AGENCIES + TAX INCENTIVES¹	4,584	5,128	5,841	713

¹ Agency subtotals and table totals may not add due to rounding.

² The USAID subtotal contains funds that are also counted in the Climate Change Science Program subtotal. Table total line excludes these double-counts.

APPENDIX B

Table 7

ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES BY AGENCY

Program Details by Agency/Account

(Discretionary budget authority and tax proposals in millions of dollars)

The following is a detailed listing of Federal climate change expenditures by agency with account level information as provided in the President's FY 2006 Budget Appendix. In general, the numbers represent budget authority unless otherwise noted. The line items in the Budget Appendix, which show account level data, may not reflect sub-account level climate change information. Therefore the numbers may not be strictly comparable.

	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed	\$ Change 2006-2005
<u>Department of Agriculture</u>				
Climate Change Science Program				
Agricultural Research Service	37	38	39	1
Cooperative State Research, Education and Extension Services	16	16	30	14
Economic Research Service	0	0	0	0
Forest Service – Forest and Rangeland Research	17	18	19	1
USDA Climate Change Science Program Subtotal	70	73	89	16
Climate Change Research Initiative²				
Agricultural Research Service	1	2	5	3
Forest Service – Forest and Rangeland Research	5	6	7	1
USDA Climate Change Research Initiative Subtotal	6	8	12	4
Climate Change Technology Program				
Natural Resources Conservation Service – Biomass R&D, Farm Bill Section 9008	14	14	12	-2
Natural Resources Conservation Service – Carbon Cycle	1	1	1	0
Forest Service R&D – Inventories of Carbon Biomass	0	1	1	0
Agricultural Research Service – Bioenergy Research	2	2	2	0
Cooperative State Research, Education and Extension Service – Biofuels/Biomass Research, Formula Funds, National Research Initiative	5	5	7	2
Forest Service – Biofuels/Biomass, Forest and Rangeland Research	0	2	3	0
Rural Business Service – Renewable Energy Program	23	23	10	-13
USDA Climate Change Technology Program Subtotal	45	48	35	-13
Total – USDA¹	116	121	124	3

	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed	\$ Change 2006-2005
<u>Department of Commerce</u>				
Climate Change Science Program				
National Oceanic and Atmospheric Administration – Operations, Research, and Facilities	116	124	181	57
Climate Change Research Initiative²				
National Oceanic and Atmospheric Administration – Operations, Research, and Facilities	34	49	58	9
Climate Change Technology Program				
National Institute of Standards and Technology (NIST) – Scientific and Technological Research and Services	10	10	7	-2
NIST – Industrial Technical Services, Advanced Technology Program ³	18	20	0	-20
NIST Climate Change Technology Program Subtotal	28	30	7	-22
Total – Commerce¹	144	153	188	35
<u>Department of Defense</u>				
Climate Change Technology Program				
Research, Development, Test and Evaluation, Army	15	51	43	-8
Research, Development, Test and Evaluation, Navy	17	11	7	-4
Research, Development, Test and Evaluation, Air Force	1	1	0	-1
Research, Development, Test and Evaluation, Defense-wide – DARPA	17	13	10	-3
Research, Development, Test and Evaluation, Defense-wide – Office of the Secretary of Defense	2	0	0	0
Total – DOD¹	51	75	60	-15
<u>Department of Energy</u>				
Climate Change Science Program				
Science – Biological & Environmental Research	129	129	132	4
Climate Change Research Initiative²				
Science – Biological & Environmental Research	27	25	27	2
Climate Change Technology Program				
Energy Conservation	868	868	847	-21
Energy Supply – Electricity Transmission and Distribution	73	103	84	-19
Energy Supply – Nuclear	309	394	416	22
Energy Supply – Renewables	352	380	354	-27
Fossil Energy R&D – Efficiency and Sequestration	455	388	405	17
Science – Fusion, Sequestration, and Hydrogen	333	371	399	28
Departmental Administration – Climate Change Technology Program Direction	0	0	1	1
DOE Climate Change Technology Program Subtotal	2,390	2,505	2,506	1
Total – DOE¹	2,519	2,633	2,638	5

	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed	\$ Change 2006-2005
<u>Department of Health and Human Services</u>				
Climate Change Science Program				
National Institutes of Health	62	65	65	1
Total – HHS¹	62	65	65	1
<u>Department of the Interior</u>				
Climate Change Science Program				
U.S. Geological Survey – Surveys, Investigations, and Research	28	30	30	0
Climate Change Technology Program				
U.S. Geological Survey – Surveys, Investigations and Research, Geology Discipline, Energy Program	1	2	2	0
Total – DOI¹	29	32	32	0
<u>Department of State</u>				
Climate Change Science Program				
International Organizations and Programs	1	1	0	-1
Climate Change Research Initiative ²				
International Organizations and Programs	1	1	0	-1
International Assistance				
Economic Support Fund	0	1	6	5
International Organizations and Programs	5	5	5	0
State International Assistance Subtotal	5	6	11	5
Total – State¹	6	7	11	4
<u>Department of Transportation</u>				
Climate Change Science Program				
Federal Highway Administration – Federal-Aid Highways	4	2	2	0
Federal Aviation Administration – Research, Engineering, and Development	0	1	1	0
DOT Climate Change Science Program Subtotal	4	3	3	0
Climate Change Research Initiative ²				
Federal Highway Administration – Federal-aid Highways	4	2	2	0
Federal Aviation Administration – Research, Engineering, and Development	0	1	1	0
DOT Climate Change Research Initiative Subtotal	4	3	3	0
Climate Change Technology Program				
Office of the Secretary of Technology - Transportation, Policy, Research and Development	4	1	0	-1
National Highway Traffic Safety Administration	0	0	1	1
Research and Innovative Technology Administration - Research and Development	1	1	1	1
DOT Climate Change Technology Program Subtotal	5	1	2	1
Total – DOT¹	9	4	5	1

	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed	\$ Change 2006-2005
<u>Department of the Treasury</u>				
International Assistance				
Debt Restructuring – Tropical Forestry Conservation ⁴	20	20	0	-20
Global Environment Facility ⁵	32	25	25	0
Total – Treasury¹	52	45	25	-20
<u>Environmental Protection Agency</u>				
Climate Change Science Program				
Science and Technology	17	20	21	1
Climate Change Technology Program				
Environmental Programs and Management	89	92	96	4
Science and Technology	22	18	18	0
EPA Climate Change Technology Program Subtotal	110	109	113	4
Total – EPA¹	127	129	134	5
<u>National Aeronautics and Space Administration</u>				
Climate Change Science Program				
Science, Aeronautics, and Technology	1,321	1,264	1,162	-102
<i>Climate Change Research Initiative²</i>				
<i>Science, Aeronautics, and Technology</i>	65	100	50	-50
Climate Change Technology Program				
Exploration, Science, and Aeronautics	227	208	128	-80
Total – NASA^{1,4}	1,548	1,472	1,290	-182
<u>National Science Foundation</u>				
Climate Change Science Program				
Research and Related Activities	215	198	197	-1
<i>Climate Change Research Initiative²</i>				
<i>Research and Related Activities</i>	30	25	25	0
Climate Change Technology Program				
Research and Related Activities	11	11	11	1
Total – NSF¹	226	209	208	0
<u>Smithsonian Institution</u>				
Climate Change Science Program				
Salaries and Expenses	6	6	6	0
Total – Smithsonian¹	6	6	6	0

	FY 2004 Actual	FY 2005 Enacted	FY 2006 Proposed	\$ Change 2006-2005
U.S. Agency for International Development⁷				
Climate Change Science Program				
Development Assistance	6	6	6	0
<i>Climate Change Research Initiative²</i>				
<i>Development Assistance</i>	6	6	6	0
International Assistance				
Andean Counterdrug Initiative	3	2	1	-1
Assistance for Eastern Europe and the Baltic States	7	5	3	-2
Assistance for the Independent States of the Former Soviet Union	47	36	32	-4
Development Assistance	125	138	118	-20
Economic Support Fund	9	5	5	0
International Disaster Assistance	2	2	2	0
P.L.-480 Title II Food Aid	1	1	1	0
USAID International Assistance Subtotal	195	189	162	-27
Total - USAID^{3,4}	195	189	162	-27
Total - ALL AGENCIES¹	5,090	5,140	4,949	-191
Energy Tax Incentive Proposals that Reduce Greenhouse Gases	0	83	524	441
Total - ALL AGENCIES + TAX INCENTIVES¹	5,090	5,223	5,473	250

¹ Subtotals and totals may not add due to rounding. Subtotals and totals supersede numbers released with the President's 2006 Budget. Discrepancies resulted from rounding and improved estimates.

² The Climate Change Research Initiative (CCRI) is a subset of the overall Climate Change Science Program; all CCRI data show in italics are non-add lines.

³ The FY 2006 President's Budget proposes termination of NIST's Advanced Technology Program.

⁴ The FY 2004 and FY 2005 enacted level for Tropical Forestry Conservation Act (TFCA) is \$20 million each year. In FY 2006, the Administration has requested a total of \$99.8 million for debt restructuring programs to be available for: bilateral Heavily Indebted Poor Countries (HIPC) and poorest country debt reduction, contributions to the HIPC Trust Fund, and TFCA debt reduction. The Budget provides the Treasury Department flexibility in determining the amount for each program. The FY 2006 funding level for TFCA has not been determined yet.

⁵ The total FY 2006 request for the Global Environment Facility (GEF) is \$107.5 million. In FY 2004, FY 2005, and FY 2006 approximately 23% of total GEF funding from all sources supports climate-related projects (e.g. expanding clean energy production and efficient energy use).

⁶ Funding levels for NASA reflect full cost accounting.

⁷ USAID data for FY 2004 are obligations.

⁸ The \$6 million in USAID Climate Change Science Program funding is also counted in USAID's International Assistance funding totals. The USAID subtotal line excludes this double-count.

Mr. FALEOMAVAEGA. I would hope so. Maybe if the State of Illinois starts sinking, maybe they can appreciate climate change at that time.

Thank you so much. We would love to have you stay on the panel that we have our two witnesses here that are going to be testifying. If you are not tied up, we may have some additional questions. But you are welcome to join our second panel if you like, or I know you have got a million other things—

Mr. WATSON. I appreciate the offer, Mr. Chairman, but I do need to get back to the office.

I do hope you and many other members of the committee and the subcommittee can go to the Bali meeting in December.

Mr. FALEOMAVAEGA. We are looking forward to it. My good friend and I are coming to Bali. As long as there is no other bombing. If no duty calls, we will be there.

Mr. WATSON. Thank you very much.

Mr. FALEOMAVAEGA. Thank you very much.

I am so sorry to Mr. Diring and Dr. Thorning for having been so patient and waiting as our second panel comes now before us as our witnesses. Mr. Elliot Diring and also Dr. Margo Thorning.

Mr. Diring is the director of international strategies at the Pew Center on Global Climate Change. He oversees the center's analysis of the international challenges posed by climate change and strategies for meeting them and directs the center's outreach to key government and actors involved in international climate change negotiations.

Mr. Diring came to the Pew Center from the White House, where he was Deputy Assistant to the President and Deputy Press Secretary. His capacity included principal spokesman for President Clinton during his administration, was Senior Adviser to the White House Staff and Press Communication Strategies, Senior Policy Adviser, also Director of Communications.

And before coming to the White House, Mr. Diring was a veteran environmental journalist, a reporter and editor of the *San Francisco Chronicle*. For about 10 years he covered the Rio Summit at Rio de Janeiro, which was really good, in 1992.

He holds a degree in environmental studies from Haverford College and was a Nieman Fellow Harvard University in the mid-1990s, studies international environmental law and policy.

Our second member of the panel is Dr. Margo Thorning. She is the managing director of the Brussels-based International Council for Capital Formation. Dr. Thorning has been a contributor and always quoted by the *Financial Times*, the *South China Morning Post*, a German newspaper, the *New York Times*, and the *Wall Street Journal*. And she has made several presentations on economic impact on climate change policy, especially to the Asia Pacific Partnership on Clean Development and Climate forums organized by the ICCF in China, India and other Asian countries.

She has published articles in the *European Files* and the *EU Reporter*. She has also made presentations on economic impact on climate change in forums in Europe, in London, Berlin, Washington, Australia. Quite a career. And also co-editor of numerous books on tax and environmental policy, including *The Kyoto Commitments: Can Nations Meet Them with the Help of Technology*.

Dr. Thorning previously served at the U.S. Department of Energy, Department of Commerce, Federal Trade Commission. She did her undergraduate studies at Texas Christian University, masters of economics at University of Texas, and her doctorate of economics at the University of Georgia.

And without further ado, I would like to ask Mr. Diring for his testimony.

STATEMENT OF MR. ELIOT DIRINGER, DIRECTOR OF INTERNATIONAL STRATEGIES, PEW CENTER ON GLOBAL CLIMATE CHANGE

Mr. DIRINGER. Mr. Chairman, I thank you for the opportunity to testify on this critical issue.

If I might, I would like to summarize the written testimony I have submitted for the record. And in so doing, I first would like to describe briefly the steps we believe the United States should take domestically to reduce its greenhouse gas emission but focus on the international issues and in particular on the type of international framework we believe is needed to ensure adequate effort by all emitting countries.

With respect to domestic climate policy, the Pew Center favors a mandatory market-based approach that sets ambitious but realistic emission reduction targets and affords the private sector the flexibility it needs to meet those targets as cost effectively as possible.

The Pew Center is a founding member of the U.S. Climate Action Partnership, or USCAP, a coalition of 27 major companies and non-profit organizations that is calling on Congress to enact such an approach.

Specifically, USCAP urges Congress to establish mandatory targets to reduce U.S. emissions by 10 to 30 percent within 15 years with a long-term goal of reducing emissions 60 to 80 percent by 2050.

To achieve these reductions, USCAP recommends a cap-and-trade program covering as much of the economy as is practical, sector-specific policies and measures to complement this cap-and-trade program, and a fully funded program for the research, development, demonstration, and deployment of climate friendly technologies.

Turning now to the international arena, I would like to begin with the following point: Mandatory action to reduce our own emissions is perhaps the single most critical step the United States can take to encourage stronger action globally.

Beyond action to reduce our own emissions, the United States also must assume a leadership role in strengthening the international climate policy framework.

In our view, an effective multilateral response to climate change requires a new treaty establishing binding commitments for all major emitting countries. Commitments are necessary because countries will not undertake and sustain ambitious climate efforts unless they are confident that their counterparts are contributing their fair share as well, and that confidence is best provided through a binding set of international commitments.

The appropriate venue for negotiating this is the U.N. Framework Convention on Climate Change, which, as you have noted, Mr. Chairman, was signed in 1992 by the first President Bush and unanimously ratified by the Senate.

Unfortunately, while the United States remains a party to the convention under the present administration, it has consistently resisted any consideration of new commitments.

Last month, the G-8 endorsed President Bush's call for a new set of discussions among the major emitting countries hosted by the United States with the goal of achieving a consensus contributing to a new global agreement under the Framework Convention by 2009.

Any consensus that is achieved, however, will yield significant action only if it is translated into binding commitments, and toward that end, it is critical that as this new dialogue gets underway, parties to the Framework Convention also begin the process of negotiating a post-2012 climate agreement. The next opportunity to launch negotiations will be the conference of the parties this year in Bali.

A critical test for the administration's support for effective multilateral efforts will be its willingness to support a decision in Bali initiating negotiations toward post-2012 commitments.

A post-2012 agreement could well incorporate the Kyoto Protocol or some of its features, such as the use of emissions trading. Kyoto is a major milestone. However, it represents just one stage in the evolution of the multilateral climate effort, and we have no expectation that the United States will ever ratify it.

Achieving broader participation and stronger commitments requires going beyond the Kyoto Protocol. What should the post-Kyoto framework look like? While we believe commitments are required of all of the major emitters, the form of commitment need not be the same for all countries. There is tremendous diversity among the major economies. The policies and pathways that work for some will not work for others. We need a flexible framework that accommodates different national strategies and circumstances by allowing variation both in the nature of commitments taken by countries and in the time frames within which these commitments must be fulfilled.

We believe there are five potential elements of a post-2012 framework. The first is economy-wide emission targets and trading, similar to what is proposed for the United States in many of the major bills now before Congress. Emission targets provide environmental certainty while trading harnesses market forces to deliver reductions at the lowest possible cost. However, China, India and other developing countries are highly unlikely to accept binding economy-wide emission limits because they believe such targets will unduly constrain their development.

An alternative approach for these countries could be policy-based commitments. They would commit to undertake national policies that moderate or reduce their emissions without being bound to economy-wide emission limits. A country like China, for example, could commit to strengthen its existing energy efficiency and renewable energy targets. These commitments would need to be cred-

ible and binding with mechanisms to ensure close monitoring and compliance.

A third potential element is sectoral agreements, in which governments commit to a set of targets, standards or other measures to reduce emissions from a given sector. Particularly in energy intensive industries like steel and aluminum, whose goods are traded globally, sectors where competitiveness may be an issue, sectoral agreements can resolve those concerns by ensuring a more level playing field.

A fourth potential element is technology cooperation, both to jointly develop critical breakthrough technologies such as carbon capture and storage and to help ensure equitable access globally to existing and new technologies.

And, finally, a post-2012 framework must provide stronger international support for adaptation efforts in the poor countries that are most vulnerable to climate impacts and the least able to cope.

I would emphasize that while different countries should be allowed different pathways, this must be more than an ad hoc series of parallel initiatives. Only by linking actions and negotiating them as a package are nations likely to put forward a higher level of effort than they would acting on their own.

Quite clearly, a major challenge in strengthening the international framework is successfully engaging China and the other emerging economies. This will require a firm but balanced approach. We must be absolutely clear in our expectation that the major developing countries assume binding commitments in a post-2012 framework.

In establishing mandatory limits on our own emissions, we will have begun to fulfill the commitments we have made with other developed countries to lead the climate effort. And having done so, it will be reasonable to expect that countries like China fulfill their responsibility as well.

Realistically, the developing countries will require incentives and assistance if they are to undertake strong climate efforts, but in return, China and the other major developing countries must assume appropriate commitments that will slow and ultimately reverse the growth of their greenhouse gas emissions.

To summarize, I believe it is incumbent upon the United States to lead by actions at home and by actively and constructively re-engaging in the international climate efforts. Only with strong U.S. participation and leadership can we achieve a fair and effective global response to the critical challenge of climate change.

I thank you for the opportunity to present these views and look forward to answering your questions.

[The prepared statement of Mr. Diring follows:]

PREPARED STATEMENT OF MR. ELIOT DIRINGER, DIRECTOR OF INTERNATIONAL STRATEGIES, PEW CENTER ON GLOBAL CLIMATE CHANGE

Mr. Chairman and members of the subcommittee, thank you for the opportunity to testify on the Kyoto Protocol and U.S. Climate Action. My name is Elliot Diring, and I am the Director of International Strategies for the Pew Center on Global Climate Change.

The Pew Center on Global Climate Change is a non-profit, non-partisan and independent organization dedicated to advancing practical and effective policies to ad-

dress global climate change.¹ Forty-three major companies in the Pew Center's Business Environmental Leadership Council (BELC), most included in the Fortune 500, work with the Center to educate opinion leaders on climate change risks, challenges and solutions.

Mr. Chairman, I would like to commend you and the members of this subcommittee for convening this hearing today on U.S. re-engagement in the global effort to fight climate change. The U.S. Congress is at long last engaged in a genuine debate on how—not if, but how—the United States should address global warming. So far, this debate has focused primarily on questions of domestic climate policy. This is a critical first step. But truly meeting the challenge of climate change will require global solutions as well. These will be possible, I believe, only with strong leadership from the United States. By broadening the scope of debate here in Washington, and by focusing attention on the international dimension of climate change, this hearing will help set the stage for constructive U.S. engagement and for an effective multilateral response.

In responding to Chairman Lantos' questions, I would like to focus in particular on the post-2012 international climate framework—what it should look like, and the steps the United States must take at home and internationally to ensure its success. I will focus as well on how the United States can best address the questions of competitiveness and developing country participation.

1) Aside from the Asia Pacific Partnership for Clean Development and Climate, and given that the United States has neither ratified nor withdrawn from the Kyoto Protocol, what is the Administration doing to advance international cooperation on climate change?

An effective global response to climate change will be possible only with U.S. engagement and leadership. Lack of action by the United States stands today as the major impediment to stronger efforts by other countries. Of the steps the United States can take to encourage global action, the single most critical is to establish unilaterally a mandatory program to limit and reduce U.S. greenhouse gas emissions. Demonstrating the will—and establishing the means—to reduce U.S. emissions will greatly alter the international political dynamic and improve prospects for international cooperation.

Unfortunately, the Administration has strongly opposed efforts by Congress to establish mandatory policy to reduce U.S. greenhouse gas emissions.

In parallel with stronger domestic action, the United States also must help lead the way to an effective multilateral climate effort. In our view, this must be accomplished through a new treaty establishing binding commitments for all major emitting countries. The appropriate venue for negotiating this treaty is the U.N. Framework Convention on Climate Change, which was signed in 1992 by the first President Bush and unanimously ratified by the Senate. Unfortunately, while remaining a party to the Convention, the United States under the present Administration has consistently resisted any consideration of new commitments.

Last month, the G-8 endorsed President Bush's proposal for a new set of discussions among the major emitting countries to be hosted by the United States. The stated goal is to achieve a consensus contributing to a new global agreement in 2009 under the Framework Convention. As proposed by the President, the primary focus of this major emitters process was to be the question of a long-term climate goal. While consensus on a long-term goal would be beneficial, it is not essential to advancing the climate effort, and should not be a precondition for moving forward with near- and medium-term commitments. In accepting the President's offer, the other G-8 leaders rightly insisted on a broader agenda for the major emitters process, including "national, regional and international policies, targets and plans . . . (and) an ambitious work program within the UNFCCC."

To be truly effective, any consensus achieved through the major emitters dialogue must ultimately be translated into binding commitments. Accordingly, as this dialogue is getting underway, parties to the Framework Convention should at the same time begin the process of negotiating a post-2012 climate agreement. The next opportunity to launch these negotiations will be at the Conference of the Parties later this year in Bali. A critical test of the Administration's support for an effective multilateral response to climate challenge will be its willingness to support a decision in Bali initiating negotiations toward post-2012 commitments.

¹ For more on the Pew Center, see www.pewclimate.org.

- 2) *Given that the Protocol lapses in 2012, what measures should the United States as the largest emitter of carbon dioxide, take to slow growth in greenhouse emissions?*

The Pew Center is a founding member of the U.S. Climate Action Partnership (USCAP),² a partnership of 29 major companies and nonprofit organizations. USCAP urges Congress to promptly enact an economy-wide, market-driven approach that includes, among other things, a cap-and-trade program that places specified limits on U.S. greenhouse gas emissions; sector-specific policies and measures to complement the cap-and-trade program; and a fully funded federal technology research, development, demonstration and deployment program for climate-friendly technologies.

- 3) *What is preventing our U.S. industries from setting up markets for buying and selling emission credits?*

The largest obstacle to the buying and selling of emission credits by U.S. industries is the absence of a mandatory cap on emissions and an economy-wide emissions trading system. Under a number of voluntary programs, there is a small amount of emissions trading occurring now among companies that want to demonstrate their environmental commitment and prepare for the eventuality of carbon constraints. However, a robust market requires both supply and demand, and in the case of a commodity like greenhouse gas credits, a cap or limit is the only way to create this demand. Without a mandatory cap on emissions, companies have no financial incentive to buy emission credits, since they can emit greenhouse gases for free.

It is important to remember, however, that creating a market is not the goal. Reducing emissions is the goal, and the establishment of a emissions market is a means of achieving that goal as cost-effectively as possible. Once a mandatory cap on GHG emissions is established in the United States, there will very likely be a robust market for emission credits and, more importantly, for climate-friendly technologies.

- 4) *Given that more than 400 U.S. cities support and adhere to the Kyoto Protocol, what is being done at the federal level to accelerate the development of technology that can be used to reduce emissions?*

Over the forty year history of federal environmental law, nearly all major federal environmental laws have been based on state and local precedents. As envisioned by the Founding Fathers, the states have served as laboratories of democracy when it comes to environmental policy, and have been joined in this role by many major municipalities. History appears to be repeating itself with climate policy, with climate friendly measures being embraced by most states and a large number of U.S. cities.

Unlike many previous environmental problems, however, climate change is a global problem. Minimizing the greenhouse gas emissions of any one city, state or country alone will not solve the problem even for that city, state or country.

Regarding federal efforts to deploy the use of climate-friendly technologies, the U.S. Department of Energy (DOE) has developed a strategic plan for its climate change technology programs, and has spent a large amount of money ostensibly to advance the technologies.

While DOE's plan provides a fine overview of GHG-reducing technologies and the opportunities each could present over the long term, and the technology R&D has provided some useful advances, they do not constitute a program for deploying these technologies, nor for providing a path to stabilizing concentrations of GHGs. Merely developing and compiling information about climate-friendly technologies is not sufficient to ensure their widespread penetration into the marketplace.

A combination of technology "pushing" activities (such as those discussed in DOE's plan) with technology "pulling" legislation that mandates reductions of U.S. GHG emissions would be the most effective and efficient way to deploy climate-friendly technology throughout the economy. Studies indicate that combining R&D incentives with carbon caps will cost the economy an order of magnitude less than relying on either R&D incentives or emissions reduction policies alone.³

²For more on USCAP, see www.us-cap.org.

³See *Induced Technological Change and Climate Policy*, Lawrence H. Goulder, Pew Center on Global Climate Change, Arlington, Virginia, October 2004.

- 5) *Given that 70 percent of greenhouse gas emissions come from the production and consumption of energy, what should the United States be doing to encourage its energy sector to provide people with clean energy while reducing greenhouse emissions?*

With the vast majority of U.S. greenhouse gas emissions coming from the production and consumption of energy, climate policy and energy policy are inextricably linked. The combination of technology-pushing activities and technology-pulling policies mentioned above in Questions 2 and 4 would help to encourage the U.S. energy sector to be more climate-friendly. In addition, a wide range of targeted policies could drive the energy system towards greater efficiency, lower-carbon energy sources, and carbon capture technologies. Energy consumption can be reduced through policies that increase energy efficiency, such as stronger appliance and vehicle fuel economy standards, improved building codes, and consumer education. Wider use of low-carbon energy sources can be promoted by extending and expanding the production tax credit for renewable energy sources, and through incentives and standards ensuring that transportation biofuels achieve net GHG reductions. Finally, increased and sustained funding to develop and demonstrate carbon capture and sequestration technologies is absolutely essential so that we can continue to rely on coal-fired electricity while reducing U.S. emissions.

- 6) *What policy suggestions could the United States make at the 2007 Summit to make the Kyoto Protocol more effective in slowing the pace of global warming, and to make it more equitable among the United States and other developed nations?*

The Kyoto Protocol is a major milestone. It established the first binding international commitments to address climate change and in many industrialized countries is driving action to reduce emissions. However, Kyoto represents just one stage in the evolution of the multilateral climate effort. Achieving broader participation and stronger commitments requires going beyond the Kyoto Protocol. A post-2012 agreement could well incorporate the Protocol or some of its features, such as the use of emissions trading and other market-based mechanisms. It is worth noting that these market mechanisms were built into Kyoto largely at the insistence of U.S. negotiators and business, recognizing their importance in minimizing the cost of emissions reduction. However, a comprehensive post-2012 agreement must include new approaches and elements and it may be more practical to fashion these under Kyoto's parent agreement, the Framework Convention. Consequently, the most important step the United States can take at the Bali summit is to support the launch of negotiations under the Convention, which, subsuming or in parallel with the negotiations already underway under the Kyoto Protocol, lead toward a comprehensive post-2012 agreement with binding commitments by all the major economies.

What should a post-2012 climate framework look like? The Pew Center's perspective on this question reflects not only our own detailed analysis but also the collective views of an impressive group of policymakers and stakeholders from around the world. As part of our effort to help build consensus on these issues, we convened the Climate Dialogue at Pocantico, a group of 25 from government, business, and civil society in 15 key countries, all participating in their personal capacities. The group included senior policymakers from Britain, Germany, China, India, Japan, Australia, Canada, Mexico, Brazil and the United States. It also included senior executives from companies in several key sectors, including Alcoa, BP, DuPont, Exelon, Eskom (the largest electric utility in Africa), Rio Tinto, and Toyota. The group's report was released in late 2005 at an event here in Congress hosted by Senators Biden and Lugar.⁴

Despite a very diverse range of interests and perspectives, the Pocantico group succeeded in reaching consensus on a broad vision of a post-2012 climate framework. This vision begins with a set of key objectives that a post-2012 framework must meet. I would like to emphasize the two most critical objectives.

First, the post-2012 framework must engage all of the world's major economies. Twenty-five countries account for about 85 percent of global greenhouse gas emissions. These same countries also account for about 70 percent of global population and 85 percent of global GDP. The participation of all the major economies is critical, first and foremost, from an environmental perspective, because all must take sustained action if we are to achieve the steep reductions in emissions needed in the coming decades to avert dangerous climate change. But the participation of all major economies is critical from a political perspective as well. For reasons of com-

⁴ International Climate Efforts Beyond 2012—the Report of the Climate Dialogue at Pocantico, is available at <http://www.pewclimate.org/pocantico.cfm>.

petitiveness, none of these countries will be willing to undertake a sustained and ambitious effort against climate change without confidence that the others are contributing their fair share. We must agree to proceed together.

At the same time, we must recognize the tremendous diversity among the major economies. This group includes industrialized countries, developing countries, and economies in transition. Their per capita emissions range by a factor of 14 and their per capita incomes by a factor of 18. This leads directly to the second objective identified in our Pocantico dialogue: The post-2012 framework must provide flexibility for different national strategies and circumstances. The kinds of policies that effectively address climate change in ways consistent with other national priorities will vary from country to country. We must allow different pathways for different countries. An economy-wide emissions target may work for some but it will not work for others. If it is to achieve broad participation, the future framework must allow for variation both in the *nature* of commitments taken by countries and in the *time-frames* within which these commitments must be fulfilled.

With these key objectives in mind, the Pocantico group then identified the potential building blocks of a post-2012 framework. The first of these is targets and trading. This is the approach employed in the Kyoto Protocol, as well as in the European Union's Emissions Trading Scheme and the Regional Greenhouse Gas Initiative being undertaken by ten states in the northeastern United States. There are very sound reasons why U.S. negotiators insisted so strongly on a market-based architecture for the Kyoto Protocol—and why many of the major climate bills now before Congress adopt the same approach. Emission targets provide a reasonable degree of environmental certainty, while emissions trading harnesses market forces to deliver those reductions at the lowest possible cost.

While targets and trading should remain a core element of the international effort, we must recognize that China, India, and other developing countries are highly unlikely to accept binding economy-wide emission limits any time in the foreseeable future. In their view, binding targets, by holding them to specific emission levels regardless of the economic consequences, would be an undue constraint on their development. Economy-wide targets also may be technically impractical for them: to accept a binding target, a country must be able to reliably quantify its current emissions and project its future emissions, a capacity that at present few if any developing countries have.

A future framework, therefore, must allow for other approaches as well. A second potential element identified in the Pocantico dialogue is policy-based commitments. Under this approach, countries would commit to undertake national policies that will moderate or reduce their emissions without being bound to an economy-wide emissions limit. This is a more bottom-up approach, allowing countries to put forward commitments tailored to their specific circumstances and consistent with their core economic or development objectives. A country like China, for instance, could commit to strengthen its existing energy efficiency targets, renewable energy goals, and auto fuel economy standards. Tropical forest countries could commit to reduce deforestation. For this to work, the commitments would need to be credible and binding, with mechanisms to ensure close monitoring and compliance. Developed countries also may need to provide incentives for developing countries to adopt and implement stronger policies. One option is policy-based emissions crediting, similar to the Kyoto Protocol's Clean Development Mechanism, granting countries tradable emission credits for meeting or exceeding their policy commitments.

A third potential element is sectoral agreements, in which governments commit to a set of targets, standards, or other measures to reduce emissions from a given sector, rather than economy-wide. In energy-intensive industries whose goods trade globally, which are the sectors most vulnerable to potential competitiveness impacts from carbon constraints, sectoral agreements can help resolve such concerns by ensuring a more level playing field. Such approaches are being explored by global industry groups in both the aluminum and cement sectors. We believe it is also worth exploring sectoral approaches in other sectors such as power and transportation where competitiveness is less of an issue but where large-scale emission reduction efforts are most urgent.

A fourth potential element is technology cooperation. This could include two types of agreements. The first would provide for joint research and development of "breakthrough" technologies with long investment horizons. Such agreements could build on the Asia Pacific Partnership and other technology initiatives but commit governments to the higher levels of funding needed to accelerate and better coordinate critical research and development. The second type of agreement could help to provide equitable access to both existing and new technologies by addressing finance, international property rights, and other issues that presently impede the flow of low-carbon technologies to developing countries.

The four elements I have outlined thus far fall under the heading of mitigation. A fifth critical element is adaptation. We need stronger adaptation efforts within the international climate framework but extending far beyond it as well. The top priority within the framework should be addressing the urgent needs of those countries most vulnerable to climate change. But the broader goal must be to spur comprehensive efforts to reduce climate vulnerability generally by integrating adaptation across the full range of development activities.

Having outlined the potential elements of a post-2012 climate effort, I now turn to the question of how these approaches can be integrated in a common framework. While different countries should be allowed different pathways, they cannot simply each go their own way. An ad hoc series of parallel initiatives will not produce an aggregate effort nearly adequate to the need. By linking actions, and negotiating them as a package, nations are likely to undertake a higher level of effort than they would acting on their own. Such a negotiation could take the form of sequential bargaining, with countries proposing what they are prepared to do under one or more of the different tracks I have described, and then adjusting their proposals until agreement is reached on an overall package. To help ensure a balanced and therefore stronger outcome, it may be necessary to agree at the outset that certain countries will negotiate toward particular types of commitments most appropriate to their circumstances. The objective would be an integrated agreement that is flexible enough to accommodate different types of commitments, and reciprocal enough to achieve a strong, sustained level of effort.

7) *Given that the U.S. is not a signatory to the Kyoto Protocol, what influence does it have, if any, to promote global action?*

Whether or not a party to the Kyoto Protocol, the United States has enormous power to shape—or to impede—global action against climate change. As the world's largest economy and world's largest emitter, the United States is arguably the single most influential force in determining the future of the international climate effort. As noted earlier, the two most critical steps the United States can take to strengthen global action are to unilaterally establish a mandatory program to limit and reduce U.S. emissions, and to lead in the development of an effective multilateral framework. Other countries eagerly await this leadership.

There are other steps the United States can take through domestic legislation to encourage developing country participation, and to address the issue of competitiveness. These issues are closely related. Ultimately, I believe, both are most effectively addressed through binding multilateral commitments. But it is important to distinguish these two issues because, in advance of a stronger global framework, each will require a different set of interim policy responses.

Competitiveness is a potential concern not for the U.S. economy as a whole, but rather for specific sectors—primarily energy-intensive industries, such as steel and aluminum, whose goods trade globally. In establishing a mandatory domestic climate program, steps can be taken to minimize or mitigate competitiveness impacts. For instance, in the design of a mandatory cap-and-trade program, potentially vulnerable sectors could be allowed special consideration in the emission allowance allocation process. Another option is to provide technology and transition assistance to affected industries and communities, possibly funded by auctioning a portion of allowances. As a longer-term option, legislation also could stipulate that if the major developing countries have not taken stronger action to reduce emissions within a specified timeframe, the United States, in concert with other industrialized countries, will consider tariffs on their energy-intensive exports or other mechanisms to correct the resulting competitive imbalances. I would note, however, that unless accompanied by positive incentives, these latter approaches are not likely to induce strong developing country action, and could lead to more confrontation than cooperation.

Engaging developing countries will require a firm but balanced approach. To begin with, we must be absolutely clear in our expectation that the major developing countries assume binding commitments in a post-2012 framework. It is true that the United States is by far the largest historic contributor to climate change. In establishing mandatory limits on domestic emissions, the United States will have begun to fulfill the commitment it made with other industrialized countries to lead the climate change effort. And having done so, it will then be reasonable to expect that countries like China fulfill their responsibilities as well. China's emissions have grown 80 percent since 1990 and could rise another 80 percent by 2020. It is essential that these trends be reversed. Realistically, given the greater capacity and historic responsibility of industrialized countries, China, India and other developing countries will require incentives to undertake strong climate efforts. The United States should provide market-based incentives through a domestic cap-and-trade

program by recognizing credits for emission reductions achieved in developing countries. In addition, targeted bilateral and multilateral assistance should be provided for the deployment of critical high-cost technologies such as carbon-capture-and storage. However, in return for these incentives, China and the other major developing countries must assume appropriate commitments that will slow and ultimately reverse the growth of their greenhouse gas emissions.

To summarize, I believe it is incumbent upon the United States to lead both by strong action at home and by actively and constructively reengaging in the international climate effort. Only with strong U.S. participation and leadership can we achieve a fair and effective global response to the critical challenge of climate change. I thank the subcommittee for the opportunity to present these views and would be happy to answer your questions.

Mr. FALEOMAVAEGA. Thank you, Mr. Diringer.
Dr. Thorning.

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

Ms. THORNING. Thank you, Mr. Chairman. I appreciate very much the opportunity to appear before you, and also I thank Congressmen Manzullo and Rohrabacher.

I would ask that my testimony be submitted for the record, but I will just summarize.

Mr. FALEOMAVAEGA. Without objection, both will be made part of the record.

Ms. THORNING. I would like to pick up on the comment that you made to Dr. Watson in the first panel about if one country is hurting shouldn't all countries try to help. Aren't we all in the same boat, so to speak, and that is really the theme of my testimony.

I think it is very important obviously that we try to reduce the growth of man-made greenhouse gas emissions, and billions of dollars have been spent in the United States and Europe and other developed countries in pursuing greenhouse gas emission reductions.

Energy security. Security supply is also a very key issue, and a lot of resources have been devoted to that. Fewer resources have been devoted to the need to alleviate global energy poverty. The 2006 International Energy Agency report made the case that approximately one-third of the population of this globe has no access to electricity and by 2030 there will still be approximately 1.3 billion people without access to electricity. And even today, approximately 1.4 million women and children are dying because they are cooking over bio-fuel, with wood, with animal waste, et cetera.

So energy poverty is an important objective that we need to pursue as we also pursue environmental protection and as we pursue energy security because, as you know, in most countries, developed countries, every 1 percent increase in gross domestic product is accompanied by about a .3 percent increase in energy use. So a country with a growing population like the United States and like the Asian countries clearly has to focus on security of supply and increasing availability of energy.

A second point I wanted to make is that according to the IEA, by 2030 fossil fuels will still be the dominant fuel, and the strong growth, as has been pointed out by our earlier panelists, are going to be in China and India.

Third, energy security is going to require huge amounts of investment, as much as 20 trillion by the year 2030. Therefore, if we

want to pursue the three goals of reducing energy poverty, increasing energy security as well as environmental protection, we want to be sure that we don't waste money. We want to be sure that government resources and private resources aren't wasted in pursuit of objectives that really don't yield much in terms of reduced emissions or increased security or better living standards for the large number of people living on less than \$1 a day.

Third point I wanted to make is that while I agree with much of Mr. Diringer's testimony, I think a cap-and-trade system has a lot of challenges that are going to make it difficult for that to be the best approach to reducing the greenhouse gas emissions. Our Brussels based think tank, the International Council for Capital Formation, has done a lot of work in the EU and has done a lot of analysis to see how that system is working. And as I pointed out in my testimony, the emission reductions that they need are simply not forthcoming.

The EU 15 is expected to be 7½ percent above 1990 levels by 2010 rather than 8 percent below as their target calls for. And as their economic growth strengthens in the EU, the target will get ever harder to pursue.

The experiment in California, and, of course, their emission reductions don't really go into effect until 2012. Given the strong projected California population growth, given the very stringent targets that they have adopted and the fact that their baseline emissions are projected to grow very strongly, I think it is going to be very tough for them to meet their targets. And if they do, I predict rather significant economic consequences.

A cap-and-trade system tends to force companies into end-of-pipe solutions rather than focusing on longer term programs that might enable them to become more energy efficient.

China and India will have every incentive to invest in energy intensive industries if we adopt a cap-and-trade program here in the United States because it will be to their advantage to continue to produce energy intensive goods knowing that their competitive advantage will be strengthened.

And, finally, a cap-and-trade system, to be successful, requires enforceable property rights so that a company would have some comfort that if they embark on an emission reduction program, the emission reduction credits would have a certain value in 5, 10, 20 years down the line. Those property rights are virtually impossible to enforce, especially when you have international arrangements between countries.

Well, what are productive approaches? I think many of the things that Mr. Diringer mentioned are helpful: Sectoral approaches, promoting international agreements. The research that the ICCF has done shows if we can strengthen China's and India's commitments to intellectual property right protection, to reducing corruption, reducing bureaucracy, strengthening their infrastructure, the foreign investment that would flow into those countries would be materially higher quality and would help them be more energy efficient and reduce their emissions of everything: NOx/SOx, mercury as well as CO2.

So I think helping these countries understand the importance of strengthening their institutions will make it easier to get the in-

vestments in there that will enable them to grow and emit less of everything.

So promoting the international agreements that Dr. Watson talked about and Mr. Diringer talked about, including Asia Pacific Partnership, including the expanded G-8 agreement that suggests that we may be looking at trying to involve the top 15 of the world's emitters in an international agreement is probably a fruitful way to go, and that is where I think we ought to be spending more of our efforts.

Thank you, Mr. Chairman.

[The prepared statement of Ms. Thorning follows:]

Energy Security, Energy Poverty and Greenhouse Gas Emission Reductions

By

**Dr. Margo Thorning, Managing Director
International Council for Capital Formation***

Before the

**Committee on Foreign Affairs
Subcommittee on Asia, the Pacific, and the Global Environment
U.S. House of Representatives
July 11, 2007**

Executive Summary

Introduction: Security of energy supplies and protection for the environment are two important policy goals on which developed countries have focused significant amounts of time and money in recent years. Developed countries have devoted less attention to the need to increase supplies of clean energy to the world's poorest inhabitants, many of whom live on less than a dollar a day. Since energy use goes hand-in-hand with economic development, many experts think increasing the supply of clean energy for the poor should be a top priority as well.

Trends in Energy Use and Carbon Emissions: Globally, fossil fuels will remain the dominant source of energy to 2030, absent sharp changes in consumption and technological breakthroughs, according to the 2006 International Energy Agency (IEA) report. The IEA projects that global primary energy demand will increase by an average annual rate of 1.6 percent between now and 2030 and carbon emissions will increase by more than half during that period. Over 70 percent of the increase in demand over the projection period comes from developing countries, with China alone accounting for 30 percent.

Energy Security Requires Investment: Rising oil and gas demand, if unchecked, will accentuate the consuming countries' vulnerability to a severe supply disruption and resulting price shock. OECD and developing Asian countries are projected to become increasingly dependent on imports as their indigenous production fails to keep pace with demand. Non-OPEC production of conventional crude oil and natural gas liquids is set to peak within a decade. Meeting the world's growing hunger for energy will require over \$20 trillion (in 2005 dollars) over the next 25 years.

Bringing Modern Energy to the World's Poor: By 2030, one-third of the world's population will still be relying on biomass (wood, charcoal, animal dung) for cooking and there will still be 1.4 billion people in the world without electricity. The inefficient and unsustainable use of biomass has severe consequences for health, the environment and economic development. Shockingly, about 1.3 million people - mostly women and children - die prematurely every year because of exposure to indoor air pollution from biomass.

Emission Trading Systems: Myths and Realities: The European Environmental Agency's latest projections show that without strong new measures, the EU 15's greenhouse gas emissions will be 7.4 percent above 1990 levels in 2010, rather than 8 percent below as required by the Kyoto Protocol. Further, the economic burden of California's new climate policy legislation is likely to be high and the targets in AB32 are unlikely to be met. In contrast, the Regional Greenhouse Gas Initiative, which affects the utility sector is unlikely to result in any emission

*The International Council for Capital Formation (www.iccf-global.org) is a non-profit, Brussels-based think tank promoting a nurturing climate for business expansion, cost-effective regulatory policies and job growth. The ICCF is an affiliate of the American Council for Capital Formation (www.accf.org).

reductions in the Northeastern states before 2015 because the targets are set above current emission levels.

Cap and Trade Approach to Emission Reductions: Emissions caps are not likely to promote new technology development because they will force industry to divert resources to near-term, “end of pipe” solutions rather than promote spending for long-term technology innovations. A fixed cap on emissions also inevitably collides with U.S. population growth; the EU-15 countries are having difficulty meeting their Kyoto targets and they have negligible population growth. In fact, if the U.S. adopts emission caps, higher energy prices will make U.S. industry less competitive vis-a-vis China and India. As a result, China and India, whose primary focus is economic growth, will see it in their interest to accelerate the development of industries that depend on a competitive advantage in energy prices.

Strategies to Increase Energy Security and Reduce Emission Growth and Energy Poverty: Increased energy security and emission reduction will depend on factors such as increased economic growth, energy efficiency, technology developments in both fossil fuels (carbon capture and storage, for example) and renewable fuels (wind and solar, in particular) and possibly increased reliance on nuclear power for electricity generation. To reduce energy poverty, vigorous and concerted government action, with support from the industrialized countries, is needed action to help people switch to modern cooking fuels and technologies.

Role of International Partnerships: The Asia Pacific Partnership on Clean Development and Climate serves as a practical model focusing on sector-specific technologies to increase energy efficiency and reduce emissions. Extending the framework of the AP6 to other major emitters will allow developed countries to focus their efforts where they will get the largest return, in terms of emission reductions for the least cost. By focusing on the key emitters, developed countries may find they have more resources for promoting both energy security of supply and reducing global energy poverty.

Energy Security, Energy Poverty and Greenhouse Gas Emission Reductions
By
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Introduction

Security of energy supplies and protection for the environment are two important policy goals on which developed countries have focused significant amounts of time and money in recent years. Developed countries have devoted less attention to the need to increase supplies of clean energy to the world's poorest inhabitants, many of whom live on less than a dollar a day. Since energy use goes hand-in-hand with economic development, many experts think increasing the supply of clean energy for the poor should be a top priority as well. My testimony attempts to put these three policy objectives in perspective and suggests ways to move forward on all three fronts. The testimony also reviews the effectiveness of current policies in the European Union and in the United States in reducing greenhouse gas emissions (GHGs) and suggests cost-effective strategies to reduce the threat of human-induced climate change.

Security of Energy Supplies

According to Fatih Birol, Chief Economist of the International Energy Agency, the major challenges faced by both developed and developing countries are: (1) the growing risk of disruptions to energy supplies; (2) the threat of environmental damage and climate change caused by energy use and production; and (3) persistent energy poverty. As he notes in a recent article in *The Energy Journal*, policymakers have devoted considerable time and resources to the first two challenges while the need of the world's poor for clean energy has received much less attention.¹ High energy prices and recent geopolitical events remind us of the essential role affordable energy plays in economic growth and human development and of the vulnerability of the global energy system to supply disruptions. Safeguarding energy supplies is once again at the top of the international policy agenda, yet the current pattern of energy supply carries the possibility of environmental damage, including changes in the global climate. The need to slow the growth in fossil-energy demand, to increase geographic and fuel-supply diversity and to mitigate climate-destabilizing emissions is more urgent than ever.

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1. Fatih Birol, Energy Economics: "A Place for Energy Poverty in the Agenda," *The Energy Journal*, Volume 28, Number 3.

A Reality Check on Trends in Energy Use and Carbon Emissions

Globally, fossil fuels will remain the dominant source of energy to 2030, absent sharp changes in consumption and technological breakthroughs, according to the 2006 International Energy Agency (IEA) report. The IEA report projects that global primary energy demand will increase by an average annual rate of 1.6 percent between now and 2030 and carbon emissions will increase by more than half during that period. Over 70 percent of the increase in demand over the projection period comes from developing countries, with China alone accounting for 30 percent. The economies and population of developing countries grow much faster than those of the OECD countries, shifting the centre of gravity of global energy demand. Almost half of the increase in global primary energy use stems from generating electricity and one-fifth from meeting transport needs, almost entirely in the form of oil-based fuels.

Coal will see the biggest increase in demand in absolute terms over the next two decades, driven mainly by power generation. China and India account for almost four-fifths of the incremental demand for coal. Coal will remain the second-largest primary fuel, its share in global demand increasing slightly. The share of natural gas also rises. Hydropower's share of primary energy use rises slightly, while that of nuclear power falls. The share of biomass falls marginally, as developing countries increasingly switch to using modern commercial energy, offsetting the growing use of biomass as feedstock for biofuels production and for power and heat generation. Non-hydro renewables - including wind, solar and geothermal - grow quickest, but from a small base, the IEA report states.

- **The Threat to the World's Energy Security is Real and Growing**

Rising oil and gas demand, if unchecked, will accentuate the consuming countries' vulnerability to a severe supply disruption and resulting price shock. OECD and developing Asian countries are projected to become increasingly dependent on imports as their indigenous production fails to keep pace with demand. Non-OPEC production of conventional crude oil and natural gas liquids is set to peak within a decade. By 2030, the OECD as a whole will import two-thirds of its oil needs in the IEA's base case scenario compared with 56 percent today. Much of the additional imports come from the Middle East, along vulnerable maritime routes. The concentration of oil production in a small group of countries with large reserves - notably Middle East OPEC members and Russia - will increase their market dominance and their ability to impose higher prices. An increasing share of gas demand is also expected to be met by imports, via pipeline or in the form of liquefied natural gas from increasingly distant suppliers. The share of transport demand, which is relatively price-inelastic relative to other energy services, in global oil consumption is projected to rise.

Oil prices still matter to the economic health of the global economy. Although most oil-importing economies around the world have continued to grow strongly since 2002, they would have grown even more rapidly had the price of oil and other forms of energy not increased. Most OECD countries have experienced a worsening of their current account balances, most obviously the United States. The recycling of petro-dollars may have helped to mitigate the increase in long-term interest rates, delaying the adverse impact on real incomes and output of higher energy prices. An oil-price shock caused by a sudden and severe supply disruption would be particularly damaging - for heavily indebted poor countries most of all.

- **Investment Needed to Promote Energy Security**

Meeting the world's growing hunger for energy requires massive investment in energy-supply infrastructure, according to the IEA report. The IEA base case calls for cumulative investment of just over \$20 trillion (in 2005 dollars) over 2005-2030. The power sector accounts for 56 percent of total investment – or around two-thirds if investment in the supply chain to meet the fuel needs of power stations – is included. Oil investment, three-quarters of which goes to the upstream, amounts to over \$4 trillion in total over 2005-2030. There is no guarantee that all of the investment needed will be forthcoming. Government policies, geopolitical factors, unexpected changes in unit costs and prices, and new technology could all affect the opportunities and incentives for private and publicly-owned companies to invest in different parts of the various energy-supply chains. The ability and willingness of major oil and gas producers to step up investment in order to meet rising global demand are particularly uncertain. Capital spending by the world's leading oil and gas companies increased sharply in nominal terms over the course of the first half of the current decade and, according to company plans, will rise further to 2010. But the impact on new capacity of higher spending is being blunted by rising costs. Expressed in cost inflation-adjusted terms, investment in 2005 was only 5 percent above that in 2000. Planned upstream investment to 2010 is expected to slightly boost global spare capacity. Beyond the current decade, higher investment in real terms will be needed to maintain growth in upstream and downstream capacity.

- **Impact of Global Energy Demand on Carbon Dioxide Emissions**

Global energy-related carbon-dioxide (CO₂) emissions will increase by 55 percent between 2004 and 2030, or 1.7 percent per year, in the IEA's base case scenario. Power generation contributes half of the increase in global emissions over the projection period. Coal overtook oil in 2003 as the leading contributor to global energy-related CO₂ emissions and consolidates this position through to 2030. Developing countries account for over three-quarters of the increase in global CO₂ emissions between 2004 and 2030 in the base case scenario. They overtake the OECD as the biggest emitter around 2010. The share of developing countries in world emissions rises from 39 percent in 2004 to over one-half by 2030. This increase is faster than that of their share in energy demand, because their incremental energy use is more carbon-intensive than that of the OECD and transition economies. In general, the developing countries use proportionately more coal and less gas. China alone is responsible for about 39 percent of the rise in global emissions. China's emissions more than double between 2004 and 2030, driven by strong economic growth and heavy reliance on coal in power generation and industry. China overtakes the United States as the world's biggest emitter before 2010. Other Asian countries, notably India, also contribute heavily to the increase in global emissions.

- **Bringing Modern Energy to the World's Poor Is an Urgent Necessity**

Although the IEA projects steady progress in expanding the use of modern household energy services in developing countries, many people will still depend on traditional biomass in 2030. Today, 2.5 billion people use wood, charcoal, agricultural waste and animal dung to meet most of their daily energy needs for cooking and heating. In many countries, these resources account for over 90 percent of total household energy consumption.

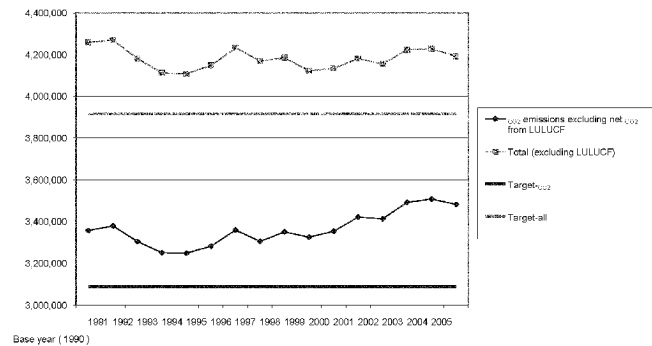
The inefficient and unsustainable use of biomass has severe consequences for health, the environment and economic development. Shockingly, about 1.3 million people - mostly women and children - die prematurely every year because of exposure to indoor air pollution from biomass. The data show that in countries where local prices have adjusted to recent high international energy prices, the shift to cleaner, more efficient ways of cooking has actually slowed and even reversed. In the IEA's base case scenario, the number of people using biomass increases to 2.6 billion by 2015 and to 2.7 billion by 2030 as population rises. That is, one-third of the world's population will still be relying on these fuels in 2030, a share barely smaller than today, and there will still be 1.4 billion people in the world without electricity. Action to encourage more efficient and sustainable use of traditional biomass and help people switch to modern cooking fuels and technologies is needed urgently. According to Dr. Birol, providing LPG cylinders and stoves to all the people who currently still use biomass for cooking would boost world oil demand by a mere 1 percent and cost at most \$18 billion a year. The value of the improvements to social welfare, including saving 1.3 million lives each year, is surely worth the cost, he notes.² Vigorous and concerted government action, with support from the industrialized countries, is needed to achieve this target, together with increased funding from both public and private sources, he concludes.

- **European Union Greenhouse Gas Emissions: Myths and Reality**

As we attempt to balance the sometimes conflicting goals of energy security, environmental protection and energy poverty reduction it is useful to examine the cost-effectiveness of current policies to reduce GHG emissions in developed countries. In the European Union, reduction of GHGs has become a major policy goal and billions of Euros, from both the private and the public sector, have been spent on this policy objective. Many policymakers, the media and the public believe that the European Union's Emission Trading System (ETS) has produced reductions in GHG emissions and that their system could serve as a model for the U.S.

The ETS, created in 2005, is a market-based, EU-wide system that allows countries to "trade" (i.e., buy and sell) permits to emit CO₂. The EU 15 (the major industrial countries) have a target of an 8 percent reduction in GHGs by 2010. As shown in **Figure 1**, CO₂ emissions in the EU 15 have risen sharply since 1990. Overall emissions (including all 6 of the greenhouse gases) have held constant only because of one-time events like the collapse of industry in East Germany after the fall of the Berlin wall and the switch away from coal to gas. In 2005, overall emissions were about 6 percent above the target. The main reason the ETS has not had much impact in reducing EU emissions is due to the fact that permits were "over allocated" to the approximately 12,000 industrial facilities covered by the system.

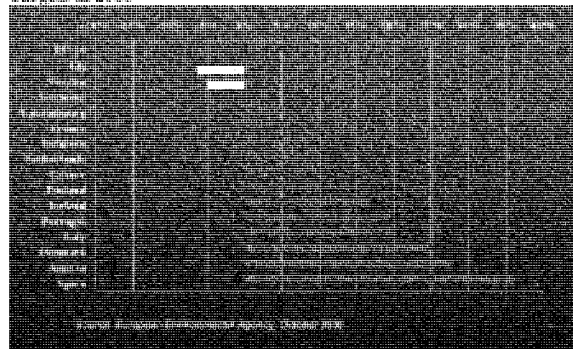
² Birol, *The Energy Journal*, page 5.

Figure 1. EU CO₂-equivalent Emissions 1990 – 2005 for EU 15 Countries

Source: Data submitted by the EU to the UNFCCC; units are in 1000 metric tons CO₂ equivalent

The European Environmental Agency's latest projections (October 2006) for the EU 15 show that without strong new measures, EU 15 emissions will be 7.4 percent above 1990 levels in 2010, rather than 8 percent below as required by the Kyoto Protocol. (See **Figure 2**).

Figure 2. Greenhouse Gas Emissions in the European Union Projected to Exceed Kyoto Targets in 2010



Now that the ETS has been operational for two years, industry and households are feeling some of the effects of the system, even though its overall impact on emission growth has been small.

As the *Washington Post* reported in “Europe’s Problems Color U.S. Plans to Curb Carbon Gases” (April 9, 2007), the ETS has been a bureaucratic morass with a host of unexpected and costly side effects and a much smaller effect on carbon emissions than planned.

Many companies complain that the ETS system is unfair. For example, Kollo Holding’s factory in the Netherlands, which makes silicon carbide, a material used as an industrial abrasive, is regarded by its managers as an ecological standout: the plant uses waste gases to generate energy and has installed the latest pollution-control equipment. But Europe’s program has driven electricity prices so high that the facility routinely shuts down for part of the day to reduce energy costs. Although demand for its products is strong, the plant has laid off 40 of its 130 employees and trimmed production. Two customers have turned to cheaper imports from China, which is not covered by Europe’s costly regulations, the *Post* reports.

“It’s crazy,” said Kusters, the plant director, as he stood among steaming black mounds of petroleum coke and sand in northern Holland. “We not only have the most energy-efficient plant in the world but also the most environmentally friendly.”

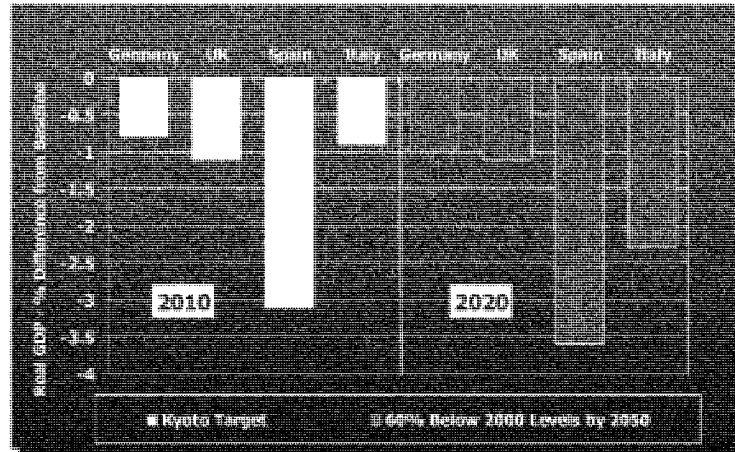
Of all the effects of the new rules, the rise in the price of power has aroused the most outrage. Much of the anger of consumers and industries has been aimed at the continent’s utility companies. Like other firms, utilities were given slightly fewer allowances than they needed. Utilities in much of Europe charged customers for 100 percent of the tradable allowances they were given—even though the government handed them out free. Electricity rates soared and environmentalists claimed that the utilities were garnering windfall profits.

The chief executive of one utility, Vattenfall, which owns a coal plant that is one of the continent’s biggest carbon emitters, defended the decision. Lars G. Josefsson, who is also an adviser to German Chancellor Angela Merkel, said higher electricity prices are “the intent of the whole exercise. . . . If there were no effects, why should you have a cap-and-trade system?”

An examination of the actual European emissions data, combined with anecdotal reports on its actual operation in the EU like those above, reinforce the idea that a cap and trade system is probably not an effective way to reduce GHG growth in the U.S.

Further, several different economic analyses show that if the EU were to actually meet its emission reduction targets under the protocol, the economic costs would be high. For example, macroeconomic analyses by Global Insight, Inc. show the cost of complying with Kyoto for major EU countries could range between 0.8 percent of GDP to over 3 percent in 2010. (See **Figure 3.**)

Figure 3: Impact of Purchasing Carbon Emission Permits on Gross Domestic Product Levels under the Kyoto Protocol and under More Stringent Targets on Major Industrial Economies



Source: International Council for Capital Formation "The Cost of the Kyoto Protocol: Moving Forward on Climate Change Policy While Preserving Economic Growth," November, 2005, (www.iccfglobal.org) and unpublished estimates for the U.S. prepared by Global Insight, Inc.

According to Global Insight, the reason for the significant economic cost is that energy prices, driven by the cost of cap/trade emission permits, have to rise sharply in order to curb demand and reduce GHG emissions. Tighter targets for the post-2012 period will also be costly. For example, a target of reducing emissions to 60 percent below 2000 levels of emissions in the year 2050 would cause losses ranging from 1.0 percent to 4.5 percent of GDP in 2020. (This target is less stringent than the post- 2012 targets adopted by the European Commission in January, 2007.) Even the EU's Commission for the Environment admits that emission reductions could cost as much as 1.3 percent of GDP by 2030. The fact that the European Environmental Agency projects that the EU 15 will be 7 percent above 1990 levels of emissions in 2010 (instead of 8 percent below) demonstrates that the mandatory ETS system as currently structured is not providing the desired results and that much stronger measures will be required to meet the Kyoto Protocol target as well as the new post-2012 target.

- **Emission Reductions in California and the Northeastern States: Myths and Realities**

Several states have adopted or are considering mandatory emission reduction targets. An examination of the GHG reduction programs in California and in the Northeastern states provides a study in contrasts.

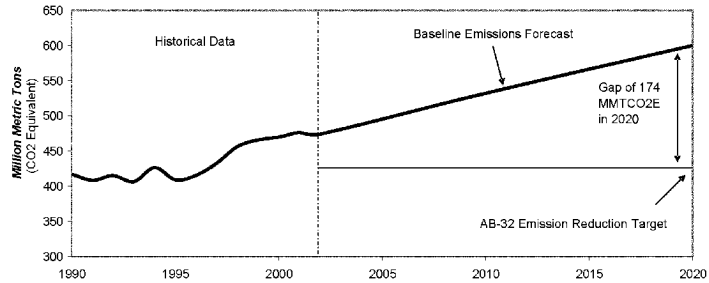
1. California's Emission Reduction Program

In August 2006, the California Legislature enacted a bill requiring the state to sharply reduce its greenhouse gas emissions. AB 32 requires California to reduce its statewide GHG emissions to 1990 levels by 2020. Reductions are scheduled to begin in 2012. The law requires that utilities account for the carbon emissions from imported electricity, which means that coal-fired electricity would tend to be replaced by electricity produced from natural gas, hydro or nuclear power. In addition, California law already required that 20 percent of electricity be produced from renewables by 2017. Achieving the emission targets in AB 32 will be a difficult challenge for Californians, given current emission trends and population growth in the state.

A major stumbling block to California's meeting the AB 32 targets is its projected in emissions and population over the next 14 years. California's GHG emissions are projected to grow by 27 percent from 2000 to 2020 under the baseline forecast, according to estimates in their Climate Action Team (CAT) report. The baseline forecast already includes assumptions about increased energy efficiency but, even so, GHG emissions are projected to rise to 600 million metric tons of carbon dioxide (MMTCO₂) by 2020, compared to the AB 32's required reduction to 426 MMTCO₂. (See **Figure 4.**)

In fact, the latest data from the U.S. Department of Energy's Energy Information Administration show that California's CO₂ emissions rose by 2 percent from 2002 to 2003. Sharp cutbacks in California's energy use would be necessary to close the 41 percent gap (174/MMTCO₂) in 2020 between projected emissions and the AB 32 target. The projected increase in California's population (from 30 million residents in 1990 to 37 million residents in 2004 and 44 million in 2020) will make emission reductions very challenging, since more people means more energy is needed for home heating and cooling, job growth and transportation.

Figure 4. California Carbon Dioxide Emissions
(Million Metric Tons CO₂ Equivalent)



Sources: **Historical Data** Gerry Bernis and Jennifer Allen, "Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2002 Update", June 2005.

Baseline Emissions Forecast Baseline forecast includes the California Energy Commission's projections of anticipated energy efficiency improvements. Source for 2010 and 2020 forecasts is California Environmental Protection Agency, "Climate Action Team Report to Governor Schwarzenegger and the Legislature", March 2006, pg. 64.

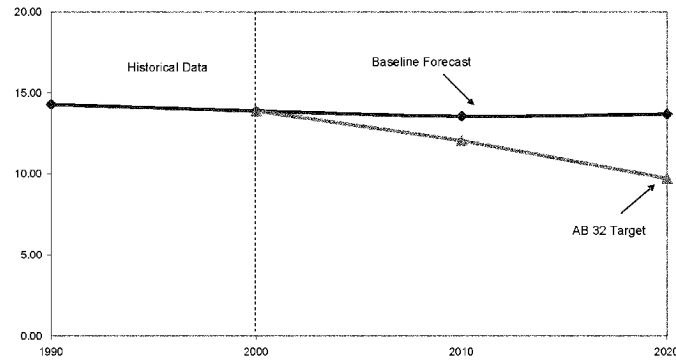
To illustrate the difficulty of reducing California's emissions to 1990 levels by 2020, consider that over the entire 1990-2000 period, per capita emissions in California fell by only 2.9 percent (see **Table 1** and **Figure 5**). California's projections show that, under its baseline forecast, emissions per capita will decline by 2.3 percent from 2000 to 2010 but will **increase** by 0.9 percent from 2010 to 2020 (see **Table 1**).

In order to meet the emission reduction target in AB 32, per capita emissions would have to fall by 13.1 percent over the 2000-2010 period and an additional 19.4 percent from 2010 to 2020 (see **Table 1**). In other words, the required reductions in per capita emissions are 4.5 to 6.5 times greater than what occurred from 1990 to 2000. The technologies simply do not exist to reduce total (and per capita emissions) over the next 14 years by the amounts mandated in AB 32—to say nothing of the time and expense required to replace existing energy using equipment—without severely reducing the growth in California's Gross State Product (GSP) and in employment.

Year	Emissions (MMT _{CO2E})	Population (Millions)	Per Capita Emissions	Percentage Change	AB 32 Emissions Target (MMT _{CO2E})	Required Per Capita Emissions	Percentage Change
1990	426	29.83	14.28				
2000	473	34.10	13.87	-2.9%	473	13.87	
2010	532	39.25	13.56	-2.3%	473*	12.05	-13.1%
2020	600	43.85	13.68	0.9%	426	9.71	-19.4%
2000-2020				-1.4%			-30%

Source: CalEPA, Climate Action Team Report to Governor Schwarzenegger and the Legislature, March 2006, Table 5.5 Baseline Inventory Estimates (pg 64). * Note that while AB 32 does not contain an emission reduction target for 2010, the CAT report does.

Figure 5. Emissions Per Capita
(Metric Tons CO₂ Equivalent per Person)



Source: CalEPA, Climate Action Team Report to Governor Schwarzenegger and the Legislature, March 2006. Table 5-5 Baseline Inventory Estimates (pg 64)

2. The Regional Greenhouse Gas Initiative

In sharp contrast to the tight emission targets of California's climate change legislation, Northeastern states have taken a much less stringent approach. Ten northeastern states³ formed the Regional Greenhouse Gas Initiative ("RGGI") in 2004, with the intention of reducing carbon dioxide (CO₂) emissions from electric utilities. In December 2005, the RGGI states agreed to a Memorandum of Understanding limiting utility CO₂ emissions to "current" emission levels from 2009 to 2014, followed by a 10 percent reduction to be phased in from 2015 to 2018. The RGGI states are now pursuing state legislative and regulatory authority to implement Model Rules for a CO₂ cap-and-trade program.

Utility CO₂ emissions represent about one-third of total greenhouse gas emissions in the RGGI states. While the RGGI agreement will cap CO₂ emissions from the utility sector, greenhouse gas emissions from transportation and other sectors are projected to increase. Overall, greenhouse gas emissions in the northeast RGGI region will grow, even when the RGGI program is fully operational.

In contrast to the likely significant impacts of California's AB32, RGGI may have very little impact on electric utility emissions or Northeastern states' economies. Evidence of RGGI's lack of "teeth" comes from a recent Congressional Research Service report, "Greenhouse Gas Reductions: California Action and the Regional Greenhouse Gas

³ ME, NH, VT, CT, MA, RI, NY, NJ, DE and MD. Maryland joined RGGI in 2007 as a result of adoption of the Maryland Healthy Air Act in 2006. Pennsylvania served as an observer of the RGGI process, but did not join the RGGI MOU.

Initiative” (April 2007). As the CRS report notes, RGGI’s initial cap of 121.3 million short tons of carbon dioxide may be higher than actual emissions when the cap applies in 2009. Private estimates also suggest that most states will not face actual reductions until the middle of the next decade. If that is the case, no reductions will be necessary and thus RGGI may be a “paper tiger” at least until 2015.

Challenges in Implementing a Cap and Trade Approach to Reduce U.S. Greenhouse Gas Emissions

Trying to reduce U.S. emissions through a cap and trade system applied at the “upstream” level (at the wellhead or minemouth) or “downstream” (at the retail level) could have significant consequences for the U.S. economy, including reduced GDP and increased unemployment rates. For example, various economic models show that the imposition of the Kyoto Protocol (a target of reducing emissions to 7 percent below 1990 levels) would reduce U.S. GDP levels by 1 to 4.2 percent annually by 2010. While the upstream approach is perhaps easier to monitor and enforce because far fewer emitters would be in the system, it suffers from the fact that final consumers won’t see much of a direct impact of the energy tax (or permit price) on their energy and fuel bills because those also include the cost of delivering the energy to consumers. On the other hand, if a business owner (say a paint manufacturer) who owns equipment that emits CO₂ has to submit an emission allowance for each ton emitted, he will be able to make a careful cost-benefit analysis of when it makes economic sense to replace his capital equipment or make other production-related decisions. An obvious question is, if a “downstream” system for reducing CO₂ emissions is impractical (because of millions of small emitting sources) and an “upstream” system results in only attenuated decision making on emissions, how efficient would a cap and trade system be in providing emission decision makers with a realistic incentive to efficiently and significantly reduce emissions?

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

- **Impact of a Cap and Trade System on Innovation**

Caps on emissions are not likely to promote new technology development because caps will force industry to divert resources to near-term, “end of pipe” solutions rather than promote spending for long-term technology innovations that will enable us to reduce GHGs and increase energy efficiency. An emission trading system will send exactly the wrong signals to investors because it will create uncertainty about the return on new investment. A “safety-valve” price of carbon (designed to create a sense of confidence about future energy costs) can easily be changed. Such uncertainty means that the hurdle rate, which new investments must meet, will be higher (thus less investment will occur) and they will be less willing to invest in the U.S. Now is the time to provide incentives for companies to voluntarily undertake additional carbon dioxide intensity reducing investments, not promote a system that raises the risk premium for any investment in our economy.

- **Property Rights Not Enforceable**

Caps on U.S. emission growth are unlikely to succeed unless all the relevant markets exist (in both developed and developing countries) and operate effectively. All the important actions by the private sector have to be motivated by price expectations far in the future. Creating that motivation requires that emission trading establish not only current but future prices, and create a confident expectation that those prices will be high enough to justify the current R&D and investment expenditures required to make a difference. Motivating new investment requires that clear, enforceable property rights in emissions be defined far into the future so that emission rates for 2030, for example, can be traded today in confidence that they will be valid and enforceable on that future date. The EU's experience over the last two years, with the price of CO₂ emission credits fluctuating between 1 and 30 euros per ton of CO₂ does not inspire confidence in companies having to make investment decisions. The international framework for climate policy that has been created under the UNFCCC and the Kyoto Protocol cannot create that confidence for investors because sovereign nations have different needs and values.

- **Developing Countries Not Likely to Accept Emission Reduction Targets**

Many U.S. policymakers are aware that even if the U.S. were to adopt a cap and trade system, it is unlikely that developing countries, where most of the future growth in emissions will occur, would decide to follow suit. In fact, if we adopt emission caps, higher energy prices will make U.S. industry less competitive vis-a-vis China, India and other developing countries. As a result, China and India, whose primary focus is economic growth, will see it in their interest to accelerate the development of industries that depend on a competitive advantage in energy prices. As this process proceeds, it will be harder and harder for China and India to reverse course and undertake policies (emission caps) which threaten these industries. Adopting GHG caps in the U.S. will, therefore, have the perverse effect of creating disincentives for developing countries to curb emissions. In addition, because developing countries use much more energy per dollar of output than does the U.S., global carbon emissions could increase due to "leakage" of U.S. industry and jobs. Therefore, it seems likely that the ETS system which the EU has implemented will fail to spread to other parts of the world and will eventually be replaced with a more practical approach to reducing GHG growth.

Strategies to Increase Energy Security and Reduce Emission Growth and Energy Poverty

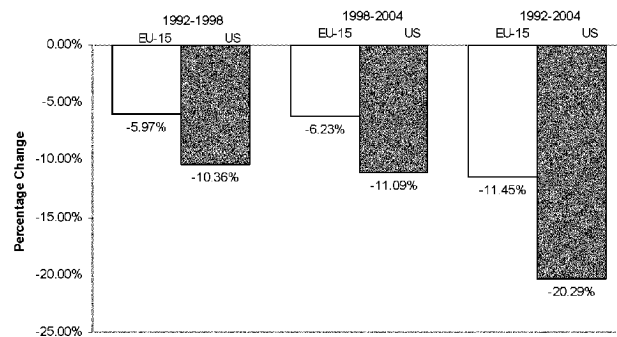
Increased energy security in the developed countries including the U. S. and the EU will depend on factors such as increased economic growth, energy efficiency, technology developments in both fossil fuels (carbon capture and storage, for example) and renewable fuels (wind and solar, in particular) and possibly increased reliance on nuclear power for electricity generation. However, in order to reduce the potential threat of global climate change, it will be necessary to increase energy efficiency and reduce the growth of greenhouse gas emissions in the developing world since that is where the strong growth in emissions is coming from. Reducing the extreme energy poverty in the world's poorest nations will take a combination of technology transfer and public-private partnerships between wealthy nations and less developed countries. Making progress on all three objectives will require a significant commitment of resources, much of which will need to come from the private sector.

- **The Role of Economic Growth and Technology in GHG Reduction**

Many policymakers overlook the positive impact that economic growth can have on GHG emission reductions. For example, in 2006, while the U.S. economy grew at 3.3 percent, CO₂ emissions fell to 5,877 MMTCO₂, down from 5,955 MMTCO₂ in 2005, a 1.3 percent decrease. Overall energy use only declined by 0.9 percent, indicating the U.S. economy is becoming less carbon intensive even without mandatory emission caps.

Internationally, the U.S. compares well in terms of reducing its energy intensity (the amount of energy used to produce a dollar of output). The U.S., with its voluntary approach to emission reductions, has cut its energy intensity by 20 percent over the 1992-2004 period compared to only 11.5 percent in the EU with its mandatory approach (see **Figure 6**). Strong U.S. economic growth, which averaged over 3 percent per year from 1992 to 2005 compared to about 1 percent in the EU, is responsible for the U.S.'s more rapid reduction in energy intensity in recent years.

Figure 6: Comparison of EU and US Energy Intensity Reduction, 1992-2004



Source: EIA, *International Energy Annual 2007*. (Percentage changes are calculated using Total Primary Energy Consumption per Dollar of Gross Domestic Product.)

Technology development and deployment offers the most efficient and effective way to reduce GHG emissions and a strong economy tends to pull through capital investment faster. There are only two ways to reduce CO₂ emissions from fossil fuel use - use less fossil fuel or develop technologies to use energy more efficiently to capture emissions or to substitute for fossil energy. There is an abundance of economic literature demonstrating the relationship between energy use and economic growth, as well as the negative impacts of curtailing energy use. Over the long-term, new technologies offer the most promise for affecting GHG emission rates and atmospheric concentration levels.

- **Strengthening U.S. Energy Security and Environmental Protection through Tax Code Reform**

The efforts of U.S. industries to increase energy security and efficiency and to reduce growth in GHG emissions are hindered by the slow rate of capital cost recovery allowed under the U.S. federal tax code and by the high U.S. corporate tax rate. As a new Ernst & Young international comparison shows, the U.S. ranks last or nearly last among our trading partners in terms of how quickly a dollar of investment is recovered for many key energy investments. For example, a U.S. company gets only 29.5 cents back through depreciation allowances in for each dollar invested after 5 years for a combined heat and power project (see **Table 2**). In contrast, in China the investor gets 39.8 cents back. In Japan, the figure is 49.7 cents and in India the investor gets 55.6 cents back after 5 years. (See full report at: <http://www.aaccf.org/pdf/Energy-Depreciation-Comparison.pdf>.)

In addition to slow capital cost recovery allowances, U.S. industry faces the highest corporate income tax rates among our primary trading partners. Of the 12 countries in the E&Y survey, only Japan had a higher corporate tax rate than the U.S. Reforms to the U.S. tax code to speed up capital cost recovery allowances and reduce the corporate tax rate would reduce the cost of capital and could have a positive impact on energy sector investment, help “pull through” cleaner, less emitting new technology, increase energy efficiency and promote U.S. industrial competitiveness.

- **The Role of International Partnerships in Promoting Institutional Change and Favorable Investment Climate in Developing Countries**

New research by Drs. David Montgomery and Sugandha Tuladhar of CRA International makes the case that agreements such as the Asia-Pacific Partnership on Clean Development and Climate (AP6), an agreement signed in 2005 by India, China, South Korea, Japan, Australia and the United States, offers an approach to climate change policy that can reconcile the objectives of economic growth and environmental improvement for developing countries (see www.iccfglobal.org for full paper). Together, the AP6 partners have 45 percent of the world’s population and emit 50 percent of man-made CO₂ emissions. The projections of very strong growth in greenhouse gases in developing countries over the next 20 years mean that there is enormous potential for reducing emissions through market-based mechanisms for technology transfer.

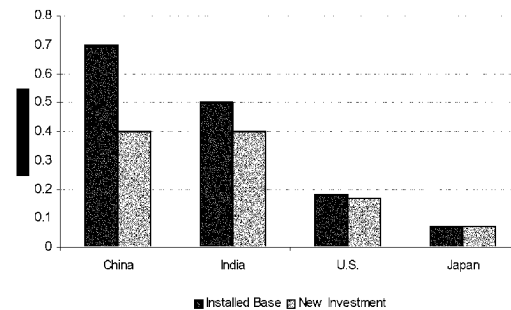
Drs. Montgomery and Tuladhar note that there are several critical factors for ensuring the success of an international agreement which relies strongly on private sector investment for success. Their research shows that institutional reform is a critical issue for the AP6, because the lack of a market-oriented investment climate is a principal obstacle to reducing greenhouse gas emissions in China, India and other Asian economies. China and India have both started the process of creating market-based economic systems, with clear benefits in the form of increased rates of economic growth. But the reform process has been slow and halting, leaving in place substantial institutional barriers to technological change, productivity growth, and improvements in emissions. The World Bank and other institutions have carried out extensive investigations about the role of specific institutions in creating a positive investment climate. These include minimizing corruption and regulatory burdens, establishing an effective rule of law, recognition of intellectual property rights, reducing the role of government in the economy, removing energy price distortions, providing an adequate infrastructure and an educated and motivated labor force.

- **Quantifying the Importance of Technology Transfer for Emission Reductions**

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

Opportunities exist because the technology of energy use in developing countries embodies far higher emissions per dollar of output than does technology used in the United States; this is true of new investment in countries like China and India as well as their installed base (See **Figure 7**). The technology embodied in the installed base of capital equipment in China produces emissions at about four times the rate of technology in use in the United States. China's emissions intensity is improving rapidly, but even so its new investment embodies technology with twice the emissions intensity of new investment in the United States. India is making almost no improvement in its emissions intensity, with the installed base and new investment having very similar emissions intensity. India's new investment also embodies technology with twice the emissions intensity of new investment in the United States.

Figure 7: Greenhouse Gas Emissions Associated with Existing and New Investment in 2001
(Million tons of Carbon per \$Billion of Gross Domestic Product at Market Exchange Rates)



Source: Promoting A Positive Climate for Investment, Economic Growth and Greenhouse Gas Reductions, W. David Montgomery and Sugandha Tuladhar (see www.icefglobal.org.)

CRAI calculations show that emission reductions can be achieved by closing the technology gap. The potential from bringing the emissions intensity of developing countries up to that currently associated with new investment in the United States is comparable to what could be achieved by the Kyoto Protocol. (See **Table 3**). These are near-term opportunities from changing the nature of current investment and accelerating replacement of the existing capital stock. Moreover, if achieved through transfer of economic technologies it is likely that these emission reductions will be accompanied by overall economic benefits for the countries involved.

Table 3: Cumulative Greenhouse Gas Emission Reductions Achievable Through Technology Transfer and Increased Investment

	To 2012 (MMTCE)	To 2017 (MMTCE)
Adopt US technology for new investment in China and India	2600	5200
Adopt US technology with accelerated replacement in China and India	4200	7700
Adopt continuously improving technology with accelerated replacement in China and India	5000	9800
<i>EU under Kyoto Protocol (without hot air)</i>	600	1400
<i>All Annex B countries under Kyoto Protocol (including US and hot air)</i>	2800	7300

Source: Promoting A Positive Climate for Investment, Economic Growth and Greenhouse Gas Reductions, W. David Montgomery and Sugandha Tuladhar (see www.iocglobal.org.)

In the first example in **Table 3**, the CRAI study assumed that in 2005 new investment in China and India immediately moves to the level of technology observed in the United States, and calculates the resulting reduction in cumulative carbon emissions through 2012 and 2017. This is the technology transfer case. In the second case, the CRAI analysis assumes that policies to stimulate foreign direct investment accelerate the replacement of the oldest capital with new equipment, giving even larger savings. In the third case, the assumption is that the new technology continues to improve over time, as it will if policies to stimulate R&D into less emissions-intensive technologies are also put in place. Even the least aggressive of these policies has potential for emissions reductions comparable to those that would be possible if all countries (including the U.S.) achieved exactly the emission reductions required to meet their Kyoto Protocol targets.

- **Strategies for Promoting Institutional Change**

Although it is clear that there is a relationship between institutions, economic growth, and greenhouse gas emissions, there is no general formula that can be applied to identify the specific institutional failures responsible for high emissions per unit of output in a specific country. If there is to be progress on institutional reform, at a minimum the key actors or stakeholders - concerned businesses, other groups with influence on opinion and policy in China, India and other developing countries (including local and regional governments), and national governments - must agree on the nature and scope of the problems and on reforms required to address the problems and identify concrete actions that each government will take to bring about institutional reforms.

For example, making progress on implementing the AP6 can be accelerated if the governments of Australia, Japan and the United States would fund research on topics such as the investment climate, the level of technology embodied in new investment, the role of foreign direct investment and potential energy savings from technology transfer, and the nature and impacts of pricing distortions on energy supply, demand and greenhouse gas emissions in China and India. Government support for research to make clear the direct consequences of proposed reforms for energy efficiency and the benefits of a market based investment climate for the overall process of economic growth would also be helpful.

- **Broadening the International Partnership to Include all Major Emitters**

At the recent G-8 Summit in Germany, policymakers agreed to take a series of steps toward GHG reductions. Recognizing that 85 percent of all emissions come from about 15 countries, G-8 leaders agreed convene the major energy consuming countries to agree on a new international framework by the end of 2008. The leaders agreed to work toward a long-term global goal for reducing GHGs and to accelerate the development and deployment of clean energy technologies. They also agreed to work towards the reduction and /or elimination of tariff and non-tariff barriers to environmental goods and services through the WTO Doha negotiations. Other points of agreement included developing and implementing national energy efficiency programs and advancing international energy efficiency cooperation as well as pursuing joint efforts in key sectors such as sustainable forestry, power generation, transportation, industry, and buildings. Finally, they agreed to enhance cooperation with developing countries to adapt to climate change.

Conclusions

To be successful, international partnerships will need to bring forth a sufficient set of offers from each country to bring about meaningful changes in institutions with significant and quantifiable effects on greenhouse gas emissions. These offers would be embodied in an agreement on actions to be taken by all parties, and a framework under which actions would be monitored and additional steps could be agreed. This is the place where the current efforts of the AP6 partnership's taskforces on clean fossil energy, renewable energy and distributed generation, power generation and transmission, steel, aluminum, cement, coal mining and building and appliances to identify technologies and investments that have profit potential and could also reduce emissions would become most useful. These investments would become in a way the reward to China and India for progress on institutional reform. The voluntary nature of private sector actions in the AP6 underscores the need for institutional reform to turn these potentially profitable investments into real projects.

The Marshall Plan is a good example of such a process. After World War II, Europe pledged various actions with the money provided by the US and, when it made good on those pledges, the program was extended and broadened. Exactly the same could be undertaken by the members of the Asia Pacific Partnership. Future actions by Australia, Japan and the United States desired by China and India would be contingent on success in implementing near term reforms agreed in the process.

The recent G-8 agreement suggests that developed countries are moving closer to achieving a consensus on how to reduce global GHG growth in a more cost-effective way than that embodied in the Kyoto Protocol. Extending the framework of the AP6 to other major emitters will allow developed countries to focus their efforts where they will get the largest return, in terms of emission reductions for the least cost. By focusing on the key emitters, developed countries may find they have more resources for promoting both energy security of supply and reducing global energy poverty.

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**Table 2. International Comparison of Nominal Capital Costs
Recovered After Five Years for Selected Energy Investments,
2006**

	Electric Generation				Electric Transmission & Distribution Lines			Pollution Control Equipment	Petroleum Refining	
	Gas	Coal	Nuclear	Combined Heat & Power Generation	Self-Generated Electricity	Transmission Lines	Distribution Lines	Smart Meters	Crude Unit (Distillation Unit)	Fluid Catalytic Cracking Unit
United States	37.7%	29.5%	37.7%	29.5%	37.7%	37.7%	29.5%	29.5%	64.3%	63.1%
Brazil	37.7%	47.5%	N/A	37.7%	63.1%	20.6%	20.6%	31.2%	89.6%	63.1%
Canada	79.6%	79.6%	79.6%	79.6%	79.6%	31.2%	31.2%	63.1%	79.6%	79.6%
China	39.8%	39.8%	39.8%	39.8%	39.8%	39.8%	39.8%	39.8%	41.3%	39.8%
Germany	30.0%	30.0%	37.5%	30.0%	30.0%	33.1%	33.1%	63.1%	79.6%	79.6%
India	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	55.6%	100.0%	100.0%	66.1%
Indonesia	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%	45.0%
Japan	49.7%	49.7%	49.7%	49.7%	45.6%	37.4%	37.4%	49.7%	76.9%	72.3%
Rep of Korea	57.7%	57.7%	57.7%	57.7%	57.7%	57.7%	57.7%	57.7%	89.0%	89.0%
Malaysia	100.0%	100.0%	100.0%	100.0%	100.0%	90.0%	90.0%	90.0%	100.0%	90.0%
Mexico	46.2%	46.2%	46.2%	46.2%	46.2%	23.1%	23.1%	23.1%	101.2%	32.3%
Taiwan	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	49.7%	96.6%	78.5%

May, 2007

Prepared by the Quantitative Economics and Statistics Group, Ernst & Young LLP

Mr. FALCOMA. Thank you.

I will recognize the gentleman from Illinois for his questions.

Mr. MANZULLO. Thank you, Mr. Chairman.

One of the problems that I see with the cap-and-trade system is already occurring in the EU. I read where a state-of-the-art factory—I believe it is in Spain—that makes automobile fasteners, the best equipment, the greatest technology, is being displaced by a factory in Morocco which is not covered by the system. Using that as a model, it means that the good guys spend the money on technology but at the same time, people not covered by it end up being the beneficiaries of it.

How do you stop something like that, I mean, if you adopt a cap-and-trade system?

Mr. DIRINGER. I am not familiar with the particular case you cite, Congressman. The type of effect that you are referring to doesn't seem necessarily a function of the cap-and-trade approach. You could have the same type of effect if you impose any type of mandatory control. This goes to the competitiveness concern and the leakage concern and underscores the need for developing multi-lateral agreements that ensure that all countries are contributing fairly to the global effort.

Mr. MANZULLO. That is the best answer. But that isn't what happens. I agree 100 percent with what you are saying. How do you bring in a nation like Morocco that is not bound by that cap-and-trade system? Because it is quite costly in order to comply with it. How do you bring them into the fold?

Mr. DIRINGER. I believe, first, you have to make the effort. And in the case of the United States, that begins by sending the signal to the world community that we are serious about this problem.

Mr. MANZULLO. Yes, but that is the same problem we have with unilateral export controls. You know, at one time, we led the world in exports of machine tools. Now we are down to 3 percent of the world's total use of machine tools because we are leading the world, we are not going to send things that people can make weapons out of and things that are not even weapons, things that are commoditized that foreign countries can buy from Canada and other countries.

We are the good guys. We wear white hats. We are going to set the example. I don't think that works.

Mr. DIRINGER. And if we send the appropriate market signals to our companies, they will have the incentive to develop advanced technologies that provide the clean energy we need; and we can lead the world in exporting those technologies and create jobs and profits here in the United States.

Mr. MANZULLO. It just doesn't work that way. It hasn't worked because the nations that buy these things will go to a more reliable supplier and buy them from Canada. In fact, you have advertisements going on in foreign countries that say, you can buy this equipment that is ITAR-free—ITAR meaning it is banned by the United States except under very strict license—and actually using the good-guy, white-hat techniques that we have imposed to set the world standard, slam it in our face, and then buying from another country.

Ms. THORNING. One of the things that I think will be helpful as we move ahead is the fact that global energy prices are not likely to fall in the foreseeable future. We can expect to see, probably, high oil prices, probably, high coal prices. And so as countries take account of the fact that their capital stock is currently probably not the best to be combined with energy prices that have risen by perhaps 200 or 300 percent, as countries turn over their capital stock, we are likely to see increased energy efficiency and reductions of CO₂ emissions.

So I think we should be looking at this as a global issue and one where we offer some carrots rather than expecting that if we in the United States adopt mandatory emission reductions, China is going to feel pressured to follow suit. I think the opposite is probably the case, because China makes it very clear economic growth is their top priority, not emission reductions.

So we need to work cooperatively with them, helping them—for example, many companies that we work with tell us that they don't put their best investment in countries that don't protect intellectual property, like China, Russia, or to some extent, India, because the technology will be stolen. So if countries begin to realize it is in their self-interest to make some of these institutional reforms which are documented in a paper on the ICCF Web site, we are going to gradually see the kind of changes that are needed to reduce all types of—

Mr. MANZULLO. You are both correct. But what is the carrot that you offer? What can you offer China? What can you offer Morocco? What is it that you will offer these nations that doesn't place an emphasis upon the environment after the United States sets the example?

Ms. THORNING. I am not sure you have to bribe them. I think you have to let them know—

Mr. MANZULLO. You used the word "carrot."

Ms. THORNING. To offer a carrot in terms of—let's say we have a coal-fired boiler that our company is—maybe one in Illinois produces that is 35 percent efficient. Maybe the Chinese coal-fired boilers are 28 percent efficient. If they wanted access to something produced by a United States or European company, if we knew they would protect our intellectual property, and not just start knocking it off and selling it to India, we would probably be willing to sell them a boiler that would substantially reduce emissions of all types and reduce greenhouse gases.

Mr. MANZULLO. We don't have that many controls on items that are used to clear the environment. But I am running out of time. But, Mr. Diringer, I know you wanted to add to that.

Mr. DIRINGER. I was going to say we have various means of export support, export promotion where we can make these United States-made technologies available to China and to other countries, perhaps at a concessional rate. And we can offer that, we can make that assistance conditional. We can offer them assistance, and in return we can ask they establish goals for themselves and report to us periodically on their progress in achieving those goals, whether those be energy efficiency goals, energy intensity goals, energy access. And in that sense we can start to move them along toward

considering entering into a multilateral framework where they would take binding commitments.

Mr. MANZULLO. That is a good point. Thank you.

Mr. FALEOMAVAEGA. The gentleman from California.

Mr. ROHRABACHER. Thank you.

We certainly want to encourage the Chinese to invest in technologies and machines that will clean their air. Anybody who has visited China in these last 10 years that I know realize that that air is murdering children in China. And that pollution that is being created is affecting large areas of the planet.

That said, I think that has nothing to do with climate change and everything to do with concern for human beings. If all of the goals of the Kyoto Protocol are met, would that—do you have any scientists that are saying that that would reverse the climate change trends that are so alarming everyone, that are the basis of the Kyoto Protocol?

Ms. THORNING. According to the data I have seen, if all the nations that took on a target under the Kyoto Protocol met it, it would make about 0.10 difference by the year 2100. It would have virtually no impact on changing—

Mr. ROHRABACHER. Right.

Ms. THORNING [continuing]. Changing the climate.

Mr. ROHRABACHER. That is my understanding as well. Are you operating under another assumption?

Mr. DIRINGER. No. I know of no one who contends that fulfillment of the existing targets under the Kyoto Protocol—

Mr. ROHRABACHER. Then how can we possibly justify such a massive expenditure that will be required to meet the Kyoto Protocol when it will not change the climate, you know, the climate trends which are supposedly the reason why we want to have the Kyoto Protocol?

Mr. DIRINGER. Congressman, I am not aware of anyone advocating the U.S. enter the Kyoto Protocol. But to your point about air pollution in China, China has a number of aggressive policies in place. It has energy intensity goals, it has renewable energy targets, it has fuel economy standards for its cars that are more stringent than we have here in the United States. It has even recently increased the export taxes on energy-intensive goods like steel and aluminum.

These policies, while not motivated by climate change concerns, do in fact help reduce its emissions growth. They are producing climate benefits. But as you correctly point out, the motivation behind these policies are national and local concerns like protecting local air quality, reducing the smog that afflicts Chinese cities, improving energy security, improving economic performance.

So those are national drivers for those types of policies, and I think it is critical that we understand and that we help the Chinese understand the synergies between those motivations and the goal of protecting the global climate. The same actions that can help to reduce greenhouse gas emissions can at the same time serve those objectives, not just in China, but here as well.

I know that air quality is a major concern in your district. Well, the steps that we would take to reduce greenhouse gas emissions by making our cars more fuel efficient, by encouraging alternative

sources of electricity production, at the same time that those reduce greenhouse gas emissions, that will also reduce the production of conventional air pollutants that are harmful to our children, our elderly, and other vulnerable populations. So I think really there is tremendous room for finding common ground between these objectives.

Mr. ROHRABACHER. I would agree that there is room for common ground, and I think that people have to look for it, rather than just assume that it is going to be a parallel direction.

For example, there are choices that people make as to whether or not there will be reductions in NO_x, which is I understand a very harmful pollutant for human beings, versus a reduction in CO₂ which, unless it, you know, explodes beyond anybody's imagination, is not going to be harmful to human beings. And, in fact, CO₂, some scientists claim more CO₂ in the atmosphere will actually produce more plant growth and make people's lives better, rather than hurt them.

So we need to—you know, it would be nice if we could talk to China and make sure that Chinese have higher growth rates in their plants and less harmful things in the air.

I would like, Mr. Chairman, I would like to put on the record an article that was recently released by Mr. James Taylor, who is Senior Fellow in Environmental Policy at the Heartland Institute, in which he quotes the results of studies from the American Meteorological Society, *Nature* magazine, researchers like Dr. Chris Landsea, who is a well-respected meteorologist, one of the world's respected meteorologists, research that was done at Geophysical Research, articles from the *New Scientist*, and a study—also quotes the *Journal of the Study of Glaciology* about glaciers, as well as the *British Journal of Philosophical Transactions of the Royal Society*, a series of mathematics, physical and engineering scientists, all of these dealing with claims that there are various catastrophes with glaciers and the rising ocean levels and the melting of the ice caps, all of which are refuted by these various sources.

I would like to put that into the record now.

Mr. FALEOMAVEGA. Without objection, the gentleman's statement will be made part of the record.

[The information referred to follows:]

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<http://www.heartland.org>**Study: 'Global Warming' Making Northern Hemisphere Greener**

Author: James M. Taylor

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Rising carbon dioxide levels in the atmosphere, together with moderately warming temperatures, have caused a substantial greening of the Northern Hemisphere. That's according to Craig Idso, founder and former president of the Center for the Study of Carbon Dioxide and Global Change, reporting in the March 14 issue of *CO2 Science*.

CO2, Climate Dominant Factors

Idso's article summarizes research first reported in the December 2006 *Geophysical Research Letters*. In that study, five scientists at universities in France and the United States studied the spatial patterns of vegetation growth north of 25 degrees latitude (a line running east-west just south of the Florida Keys) between 1980 and 2000.

The five scientists reported, "The results indicate that changes in climate and atmospheric CO2 likely function as dominant controllers for the greening trend during the study period."

Prior studies on variations in northern hemisphere vegetation taken from satellite data from 1981 to 1999 had shown vegetation had increased by 8 to 12 percent across North America and Eurasia during the time period.

"At the continental scale, atmospheric CO2, temperature, and precipitation account for 49%, 31%, and 13% of the increase in growing season LAI [Leaf Area Index], respectively," the five scientists found.

Carbon Dioxide Benefits

Looking more deeply into the study, Idso reported, "In response to what climate alarmists describe as unprecedented increases in the air's CO2 content and temperature, which they characterize as phenomena worse than nuclear warfare and global terrorism, the bulk of the terrestrial vegetation of the Northern Hemisphere north of 25°N has not only not suffered because of them, it has actually grown more robust."

There are "a number of biological consequences of elevated atmospheric CO2 concentrations," Idso wrote.

"The best known of these important impacts is probably CO₂'s aerial fertilization effect, which works its wonders on plants that utilize all three of the major biochemical pathways of photosynthesis (C3 [typical photosynthesis], C4 and CAM [C4 and CAM are photosynthesis adopted to arid conditions])," Idso continued.

"In the case of herbaceous plants," Idso noted, "this phenomenon typically boosts their productivities by about a third in response to a 300 ppm increase in the air's CO₂ content, while it enhances the growth of woody plants by 50% or more."

Tropical Forest Trends

The new study reinforces prior scientific findings regarding a greening of the Earth during moderate warming since the late 1970s.

In 2005, NASA scientist Kazuhito Ichii led a team of scientists that reported in *Global and Planetary Change* on the interannual variability and trends in the productivity of tropical forests from 1982 to 1999.

After studying tropical forests in Africa, Asia, and the Amazon, the Ichii team reported, "recent changes in atmospheric CO₂ and climate promoted terrestrial GPP [gross primary productivity] increases with a significant linear trend in all three tropical regions."

Benefits Overlooked

"This is one of the little-talked about benefits of global warming," said Iain Murray, a senior fellow at the Competitive Enterprise Institute. "Agricultural experts have long reported that the optimum temperature is actually warmer than it is today. They have also long told us that an increase in atmospheric carbon dioxide would benefit global plant life.

"The benefits of warmer temperatures are not restricted to plant life, either," Murray added. "Another benefit is lower human mortality, [which is] associated with warmer temperatures. A warmer planet means fewer weather-related premature deaths.

"Global warming presents opportunities as well as challenges. Our goal should be to capitalize on the benefits of warmer weather while mitigating the potential challenges. It is an entirely realistic idea to capitalize on the benefits of a warmer climate," Murray explained.

James M. Taylor (taylor@heartland.org) is managing editor of Environment & Climate News.

Mr. ROHRABACHER. And back to the issue at hand in terms of what we do with China and these other countries, I buy your argument that we should try to sell them the technologies and try to show them that it is profitable to do so. I buy that. We should put a lot of emphasis on that.

There are new forms of, for example, nuclear energy systems that cannot melt down and that will not produce a byproduct that lasts forever. It is called a high temperature gas reactor. It is being developed by the former Soviet Union, Russia, and General Atomics in California. Do you know about that particular—

Mr. DIRINGER. No.

Mr. ROHRABACHER. What is your view then on using nuclear energy as a way to clean the air in these places?

Mr. DIRINGER. Well, as we heard earlier in the discussion between the chairman and Dr. Watson, nuclear energy is a major

component of our electricity mix in this country. It is difficult in contemplating greenhouse gas reductions to remove—contemplate removing a technology that produces virtually zero greenhouse gas emissions. We expect that nuclear energy will remain a major part of our electricity mix.

However, as we all know, there are some serious issues around nuclear energy—waste disposal, proliferation.

Mr. ROHRABACHER. Might I suggest that you personally, and your people you work with, take a look at the high pressure gas reactor that is at General Atomics? And it is a new system that—the traditional objections that are made by the environmental movement do not apply to that technology.

For example, there is no byproduct to be made into a weapon. For example, it actually eats the plutonium and other things, rather than has a major leftover factor there.

So I would suggest if you don't know about that, that is something maybe you should look into.

Mr. DIRINGER. I certainly will. That sounds like a very promising technology. It may be some of my colleagues are aware of it, but we will certainly take a look.

Mr. ROHRABACHER. I would be worried if we were going to be suggesting to several of these Third World countries that in order to clean the air they should buy our nuclear reactors if they ended up with lots of waste that was left over and also lots of stuff that was left over that they could build bombs with.

Mr. DIRINGER. Absolutely.

Mr. ROHRABACHER. The last thing we want do is promote things that will clean the air, but make it more likely for people to drop bombs on one another. And so there is an alternative to that.

I want to thank you for your testimony. I do believe there are some parallels here. I think we have to work at it to get to that point.

And thank you very much, Mr. Chairman.

Mr. FALCOMA. Thank the gentleman for his questions.

Dr. Thorning, would it be accurate for me to say that in the midst of all the discussions, whether it be by the Congress or even among the experts on environmental issues, the very issue that you raise I think really needs attention, the fact that poverty-stricken countries and their energy needs do not seem to be part of the equation that we are talking about.

Would I be accurate to say that in terms of how we have been discussing this for the past several years? Especially among the industrialized countries, but never enough attention seems to be given to the very point that you raised.

Ms. THORNING. Yes, Mr. Chairman. And I think the International Energy Agency's new focus on that in the last year or so, I hope will help bring more attention to how we can alleviate global poverty. Energy is essential to reduce poverty, and when you think that today one-third of us have no electricity, for example, I think it is important that we balance how we spend society's resources.

And that is why I want to make sure that the way we approach climate change and the way we approach greenhouse gas emission reduction is as cost effective as possible, because I want to see—

I would like to see more resources going to provide the kind of energy that developing countries need.

For example, Dr. Fatih Birol, the chief economist of the International Energy Agency, released a paper in the *Energy Journal* that just came out, pointing out that for about \$18 billion a year we could provide LPG small stoves to, you know, the 1.4 million women and children who are being affected by using biofuels. So for a relatively small amount of society's resources, if governments and the private sector could work together on that, we could make a huge difference in the quality of life and have an impact on reducing poverty.

Mr. FALEOMAVAEGA. With all the many bills being introduced left and right, whether they be related to energy or climate change, do you suggest that there are any provisions in current proposed legislation that cover this concern that you raised?

Ms. THORNING. I am not sure. That is probably a better question—I don't think so for—I know there is a lot of focus on technology transfer, and clearly the Asia-Pacific Partnership has a component of clean fossil fuel.

But those are the six relatively developed countries; we are not talking about the poorest countries in the world here, so I am not certain. Maybe USAID has something that would focus on that. But I think if we could make this more a focus of international attention, the need to get basic, cleaner energy into the hands of the world's poorest, that would make a huge difference in terms of the quality of life.

There is an issue, if I may raise, with respect to U.S. policy in terms of cleaner energy. In my testimony, I have a table, Table 2, that is an international comparison of capital cost recovery allowances for energy investment. And we asked Ernst & Young to look at the rate of recovery, how fast an investor gets his money back, for about 11 different assets. And interestingly enough, the U.S. has the slowest capital cost recovery for almost every asset that we looked at.

Mr. FALEOMAVAEGA. Why is that?

Ms. THORNING. Because our Tax Code has slow depreciation. And then, in addition, we asked them to look at tax rates. And we also have the highest effective tax rate, because we have about the highest corporate tax rate in the industrialized world.

And I would be happy to submit that whole report for the record.

[NOTE: The information referred to is not reprinted here but is available in committee records.]

Mr. FALEOMAVAEGA. Please. I would love to receive your—

Ms. THORNING. So I am hoping that as we look at energy policy, we will look at how improving the rate of capital cost recovery could incentivize the kind of investments in smart meters, for example, to promote electric efficiency in electricity use, combined heat and power, and so forth.

For example, for a combined heat and power investment a U.S. investor gets \$0.29 back on the dollar after 5 years. Whereas in Brazil you are getting \$0.37 back, in Germany you are getting \$0.55 back, in Malaysia you are getting a dollar back for every dollar. So our capital cost recovery, our tax system is just not appro-

priate for the 21st century or for incentivizing the kind of investments we need to stay competitive and reduce emissions.

Mr. FALEOMAVAEGA. In your best opinion, Dr. Thorning, is this being properly addressed by other related commercial committees dealing with taxes and all that? Do they recognize this very concern that you have?

Ms. THORNING. Do other countries recognize?

Mr. FALEOMAVAEGA. No, our own Government.

Ms. THORNING. Well, our own Government, I think, is aware of it. The question that they raise when you ask, could we not speed up depreciation for smart meters, or couldn't we speed it up for nuclear power generation is that it is a budget item, and if we accelerate depreciation, then it will cost money.

But what people have to realize is, it is only a timing issue, because if you accelerate depreciation and speed it up for 5 years, then in the remaining 5 years you have fewer deductions, and so you are going to pay higher tax revenue in the out years. So it is really a timing issue, not a permanent revenue loss.

Mr. FALEOMAVAEGA. I didn't mean to disregard you, Mr. Diringer, but I wanted to ask you—both of you correctly stated that when you are talking about the needs of some 190 countries of the world, all with different specific needs and resources available, how do you go about striking a balance, not only addressing the question of climate change, but the fact that the resources are different, limited in many circumstances?

So you are looking at the less developed countries as opposed to the 25 countries that currently control 80 percent of the world's energy and whatever you want to call it. How do you go about developing a system, let's say come December at the Bali convention, and making a proposal that will address the needs of those countries that are less fortunate than the industrialized?

Mr. DIRINGER. There is an important principle established in the U.N. Framework Convention, common but differentiated responsibilities, that recognizes while we all share some responsibility for having created the problem and for addressing the problem of climate change, there are tremendous differences among countries in terms of the level of responsibility they bear, as well as their capacity to deal with the issue and their circumstances, whether it be their resource bases or their level of development or what have you.

So there is a common understanding that one size does not fit all, that we should not all be expected to take on either the same type of commitment or the same level of commitment.

So what we would favor is a flexible framework which allows for a range of commitment types and for a range of levels of commitment within those commitment types. And we shouldn't expect all 190 countries to be taking on commitments. We really need to focus those efforts on the major emitters.

Some of those other countries, though, are really bearing the brunt of climate impacts, and we need to address their concerns at the same time. So in considering a post-2012 package, we need to make some allowance for the adaptation needs of those countries and provide some assistance to a developing world in taking on and

incorporating the types of technologies they need to pursue a cleaner, more sustainable development path.

In terms of how we might initiate a path in that direction in Bali, I think we need a decision in Bali establishing a clear timetable for negotiating a post-2012 framework. And I think that it should be clear in that decision that this framework should entail binding commitments for the major emitting countries.

Mr. FALEOMAVAEGA. There seems to be a sense of anxiety among the countries of the world about post-2012. And that anxiety seems to set the idea that what if the U.S. decides not to cooperate or even to participate on a post-2012 basis in addressing the serious issues of climate change?

Of course, we know we won't have this administration to contend with, whoever is going to be coming in. But do you really think that without U.S. leadership in this whole effort it puts a real serious dent in how the world community is going to look at how we are going to be able to address this very issue?

Mr. DIRINGER. I think it is more than a serious dent, Mr. Chairman. I think that whether withholding its participation or actively participating, the United States is the single most influential force globally in deciding how the world community handles this issue. And as long as the U.S. is not prepared to take on a binding commitment, other countries will not be prepared to as well.

I mean, the European Union has pledged unilaterally to go further in its emissions reduction. They are talking about reducing their emissions 20 percent below 1990 levels by 2020. We can debate whether they, in fact, will be able to achieve that, but they have declared their intent to do that with or without an international agreement.

But I think outside the EU you would be very hard pressed to find countries that are prepared to undertake stronger efforts to reduce their emissions without a very positive indication from the United States that we are prepared to institute mandatory limits on our own emissions in the United States and prepared to enter into a commitment with other countries.

Mr. FALEOMAVAEGA. Dr. Thorning?

Ms. THORNING. One of the things that I think we need to keep our eye on is that the European Union is not likely to meet their Kyoto target. And the new tighter targets that they are—you know, have proposed and accepted, I believe, for the 2020 period, are probably not going to be met either—you know, the 20 percent renewable target, 20 percent reduction in CO₂.

So what I see happening in Europe is giving lip service to these targets. But when it comes to enforcing them and actually imposing fines on companies, I am not sure that that is going to happen.

On the other hand, if the EU imposes trade barriers against goods from countries that don't have mandatory caps, you know, that is something that, you know, would have serious consequences, I think, for international trade.

So I see the European system as not successful as it is currently set up. And I would like to think that we can learn from other people's mistakes, and as we move ahead, try to come up with a system based upon perhaps sectorial targets, perhaps some of the things that Mr. Diringer has discussed, without necessarily having

mandatory requirements—that if China doesn’t meet this, that, and the other, some consequence will befall them. Because I don’t think we can threaten them; I think we can induce them.

And, you know, like the Marshall Plan after World War II, where we asked for countries to make changes, and when they made them more investment flowed, more trade flowed, I think if we use a more conciliatory, carrot-based approach, we are more likely to see the kind of changes we need to help countries where emission growth is going to be so high reduce their emissions, and at the same time continue to work in the developed countries to get our emissions down through, A, a better Tax Code, technology development, and you know, other measures.

Mr. DIRINGER. If I could, Mr. Chairman, I would certainly agree that the European experience provides us with an opportunity to learn from their successes and their failures. And those lessons should certainly be taken into account as we design a mandatory program here in the United States. However, I think it is premature to conclude that the European Union will not meet its Kyoto target.

According to the latest assessment by the European Environment Agency, which is a semi-watchdog agency within the European Commission, the EU is, in fact, on track to meeting its target. It won’t meet that target entirely with domestic reductions. It will be in part through existing measures, in part through measures that are now planned, but not yet implemented; but it will also be by relying on the flexibility mechanisms designed into the Kyoto Protocol, primarily the clean development mechanism, which provides credits for investments in emission reduction in developing countries, as well as some credit for its forest sinks. And when all of that is added up, according to the EEA’s estimates, Europe will achieve its 8 percent reduction below 1990 levels.

I think it is also important to recognize that the ETS, the Emissions Trading Scheme, within the European Union, is only one of the mechanisms that the EU is looking to achieve its reductions. And it is only now in its initial learning phase. It started up last year; and for these 2 years, this was really just a trial run for the ETS.

And the biggest problem that we saw in that trial run was an over allocation of emissions. There were more allowances granted than there were emissions. And as a result, the price of the allowances fell and there were no real reductions achieved.

I think there were two reasons for that. First, the Commission did not have good baseline data on emissions. It did not have mandatory reporting of emissions before the ETS came into place, so it didn’t really know where the emissions were. So it makes it hard to make your allocation decisions in the absence of good information.

And second, I think some member states were not, frankly, at the point of having generated the political will to impose real limits on their industries.

Well, the Commission is now toward the end of the process of reviewing the national allocation plans for the second phase of the trading scheme, which begins in 2008 and runs through 2012. It has solved the data problem, because it now does have a good han-

dle on where the emissions are. And it is enforcing the political will issue by insisting that the member states establish reductions below 2005 levels—running on the order of 7 percent below 2005 levels, I believe.

So I think we will begin to see real scarcity within the EU Emissions Trading System, and we will see real reductions coming from that system. And until we actually enter the Kyoto compliance period, 2008 to 2012, we won't really know whether the EU is going to meet its target. But I think the decisions reached by heads of state at the spring council meeting are an indication of strong political will within the European Union to continue down the path of emissions reduction.

Mr. FALEOMAVAEGA. What do you both expect will be the outcome, or the likelihood of what issues will be taken up seriously, at the Bali forum coming up this December? Do you think it will have substance or just be another meeting with no real results?

Ms. THORNING. I have the impression that, at least from the United States side, there is going to be more focus on getting cooperation among major emitters, where the top 15 to 20 emitters in the world begin to implement some of the ideas that are embedded in the Asia-Pacific Partnership. Because that is what makes sense, company-to-company trade, private investment driving the kind of changes that are needed to increase energy availability and reduce emissions of all types.

I have a feeling we will be moving away from trying to get approval of, you know, 187 countries, because while that would be nice, clearly, you know, we need to focus our efforts where most of the emissions are coming from.

So that would be my hope and what I expect to see the U.S. at least pushing for.

Mr. DIRINGER. I think the major issue in Bali will be whether there is established a process under the Framework Convention to begin considering post-2012 commitments.

As you know, there already is a process under way under the Kyoto Protocol. Kyoto required that the parties to the Protocol initiate a new negotiation in 2005. They have begun that process, but frankly, I think that is pretty much in a holding pattern. That negotiation is not likely to achieve a successful outcome because those countries, the countries that already have commitments under Kyoto, are not going to take on new commitments without the United States and without the major emerging economies.

So what we need to see is a parallel process under the Framework Convention, either a parallel process or a process that can subsume the Kyoto Protocol process and establish a framework and timetable for negotiating a post-2012 agreement.

I think we might well see agreement on some type of process. The question is: How clearly is it defined and how clearly is the outcome of that process defined at this stage?

Mr. FALEOMAVAEGA. I don't have any more questions. Do you have any?

Mr. ROHRBACHER. Just one thought, and that is, whenever I hear about these discussions of the Kyoto Protocol and all of these things that—you know, over and over and over again, we just hear this sort of a—it is an establishment maneuver to push things in

a certain direction. And it just seems to me that what we have gotten out of this over the years is probably \$10 to \$20 billion worth of spending that was totally wasteful.

The development of that new nuclear reactor that I talked to you about, that was more effective and more efficient, had nothing to do with what we are talking about here today. If the emphasis would have been on trying to find new technologies that are more efficient, and ways of—especially nuclear reactors that would not produce nuclear weapons or nuclear waste, we would have solved these problems. Instead, what we have done under the name of global warming research, climate change research is paid for wonderful new facilities.

I went down to Scripps Institute. They have got a wonderful global warming center there worth millions of dollars right on the coast, beautiful executive lunch area, all paid for in the name of global warming. And we have got people for the last 10 and 20 years who have had their guaranteed incomes, you know, their wonderful scientists on the dole, when that money should have instead been focused on building the technology that would change the reality that certain people face, the children of China who are now going to have emphysema by the time they are 30 years old and be a tremendous drag on that society, but more than that, a humanitarian nightmare in that so many young people's lives will be ruined by breathing in that rotten air.

Mr. FALCOMA. If the gentleman will yield.

Mr. ROHRBACHER. Yes, sir.

Mr. FALCOMA. I asked Dr. Watson earlier how we went about spending \$37 billion addressing this very issue, and somehow I was not able to get specifically how it was.

Mr. ROHRBACHER. It is like a huge black hole that scientists have learned, if they can say that there are going to be more wildfires in California—a new report indicates global warming will create more wildfires in California.

Now there is probably a \$2 million research grant that sucked up money to tell us that there are going to be wildfires in California when, instead, that \$2 million—I know several scientists and several inventors in California that are involved in projects that if they had had \$2 million would dramatically impact air quality in California, but they can't find the \$2 million. And instead some scientist got that for telling us about some pontification of how global warming may impact wildfires.

And you just go down the list. There are hundreds, if not thousands, of these grants that have been given out, and we have turned scientists that should have been using their time in a more productive way into scientists that simply proved global warming; and so that—for a big PR type of move. And it is disheartening to me, because every time we have debated this in session, people have started off by saying, Well, the issue is closed; you know, the scientific research is in, there is no doubt there is global warming going on. And, of course, that was doing nothing but trying to dismiss any arguments among the hundreds of scientists that I quoted over these last few months, just dismissed their arguments, don't deal with them, by people who are engaged in spending huge amounts of taxpayers' dollars.

And once that money is gone, it is gone. It means that we can't help people. We don't have the resources to do that.

Thirty-seven billion dollars is a huge amount of money, and I would hope that—anyway, it seems to me that the politics in this thing has invaded the scientific community. And we are not—and it is not good for science or regular people's lives.

But with that said, I am hopeful, because I do believe in science, and I do believe in human progress, and I do believe that perhaps with the focus that some people have managed to get people's attention on these things, perhaps we can now come up with technologies that will clean the air and make us more energy self-sufficient and—even though some of the scare tactics have certainly, I think, not been justified.

So thank you very much, Mr. Chairman.

Mr. FALEOMAVAEGA. Thank you.

I want to assure our two distinguished witnesses this afternoon that the subject of climate change, or global warming, Kyoto Protocol—whatever iteration you might want to have, it is not a passive issue here among members.

But I do want to, if I could ask our two distinguished witnesses—we would really appreciate it, and I will keep the record open for 10 days or whatever it takes to receive any further recommendations that both of you might have by way of any of the proposed legislation or bills that you think should receive attention in terms of establishing a policy that you feel will be helpful in resolving this issue of climate change.

And, again, I am sorry I don't have any food to give you to pay for or to compensate for your patience for all these hours in having to wait, but I sincerely hope that we will have another opportunity again to have you both appear before this Subcommittee on Global Environment.

Thank you so much. The hearing is adjourned.

[Whereupon, at 5:21 p.m., the subcommittee was adjourned.]

