

GLOBAL CLIMATE CHANGE

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY RESEARCH,
DEVELOPMENT, PRODUCTION AND REGULATION

OF THE

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE

AND THE

SUBCOMMITTEE ON NATIONAL ECONOMIC
GROWTH, NATURAL RESOURCES, AND
REGULATORY AFFAIRS

OF THE

COMMITTEE ON GOVERNMENT REFORM
U.S. HOUSE OF REPRESENTATIVES

ONE HUNDRED SIXTH CONGRESS

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ON

GLOBAL CLIMATE CHANGE: THE ADMINISTRATION'S COMPLIANCE WITH
RECENT STATUTORY REQUIREMENTS

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GLOBAL CLIMATE CHANGE

THURSDAY, MAY 20, 1999

U.S. SENATE, SUBCOMMITTEE ON ENERGY RESEARCH, DEVELOPMENT, PRODUCTION AND REGULATION OF THE COMMITTEE ON ENERGY AND NATURAL RESOURCES, AND THE U.S. HOUSE OF REPRESENTATIVES, SUBCOMMITTEE ON NATIONAL ECONOMIC GROWTH, NATURAL RESOURCES, AND REGULATORY AFFAIRS OF THE COMMITTEE ON GOVERNMENT REFORM,

Washington, DC.

The subcommittees met jointly, pursuant to notice, at 2:49 p.m., in room SD-366, Dirksen Senate Office Building, Hon. Don Nickles presiding.

OPENING STATEMENT OF HON. DON NICKLES, U.S. SENATOR FROM OKLAHOMA

Senator NICKLES. Good afternoon. I want to thank everybody for their participation in today's hearing.

I am very pleased to be chairing this along with my colleague and friend Congressman McIntosh. It is a very rare thing that we do in the House and the Senate, to have a joint hearing, but the importance of this I think certainly justifies it.

This hearing is on the Clinton administration's fiscal year 2000 budget for climate change and the administration's compliance with some very important language that arose out of several appropriation bills last year. I think the very fact that we have convened this joint hearing tells you about the level of significance with which both the House and the Senate hold this issue.

On the specific issue of ratification of the Kyoto Protocol, the Senate has an especially strong position, with 95 Members in the 105th Congress voting to support the Byrd-Hagel resolution that says the Senate will not ratify the protocol unless: one, it does no serious harm to our economy; and, two, it includes developing countries.

So far neither criteria has been met to our satisfaction. Since the treaty is not ratified, both houses of Congress are very interested in any money that the administration requests and spends relative to climate change activities, which brings us to the subject of today's hearing. For fiscal year 1999 the Clinton administration announced a 5-year global climate change initiative and requested approximately \$6.3 billion for the first year of the initiative. Fiscal year 2000 is the second year of that initiative and the budget request is over \$4 billion. Congress does not yet know what the total

request might be for the full 5-year plan. At this rate, it could well be over \$20 billion, for a treaty that is not yet ratified.

Is the administration trying to implement the Kyoto Protocol through the so-called backdoor measures? The Knollenberg amendment included in the fiscal year 1999 VA-HUD appropriation bill was written to prevent that and we have several witnesses today, including the Congressman himself, to tell us what the intent behind that amendment was and whether the administration is complying.

Another issue is not just what the administration is spending, but why they are spending it. What is the American taxpayer getting for their money? Has the administration adequately justified each line item in the budget? Again, our witnesses today will help us elaborate on that in detail.

Since we have many witnesses and Members today, I will try and keep my statement short. I just would like to say that it is a pleasure for me to co-chair this with my friend and colleague Congressman McIntosh. I will call upon him for his opening statement, as well as my friends and colleagues Senator Akaka and Senator Thomas—Senator Craig as well. After that we will alternate on a first come, first served basis.

In addition, I will ask all of our witnesses to try and keep their statements to 5 minutes so we can expedite the hearing.

I call on my colleague Congressman McIntosh.

[A prepared statement of Senator Graham follows:]

PREPARED STATEMENT OF HON. BOB GRAHAM, U.S. SENATOR FROM FLORIDA

Thank you, Mr. Chairman for holding a hearing on this very important topic.

Many of the steps in the Administration's April 20 submittal to Congress address national priorities. Energy efficiency addresses energy security, local air quality, and energy savings. If energy efficiency can also have a positive impact on greenhouse gas emissions, that is simply icing on the cake. These programs have a positive impact on the environment and a positive impact on the economy, independent of climate change.

The scientific evidence on climate change continues to mount with the passage of time. In the absence of a climate change policy, sea level in Florida is projected to increase by 18 to 20 inches by 2100, according to the Environmental Protection Agency. I would like to call your attention to this chart, which was taken from Columbia University lecture material on the decline in Arctic Sea ice. The prediction for 2100 equates most closely with the image on the upper left of the chart. Some scenarios project a sea level rise of 18 to 20 feet over hundreds of years, which equates most closely with the image in the lower right. My state may drown by inaction.

Much debate has occurred over the Kyoto agreement, which, of course, has not been ratified by the Senate. I fear that this debate may cause us to ignore what I consider to be a more pressing issue—developing an effective strategy for addressing climate change. That begs two questions: do we have a strategic vision of how we are going to respond to climate change? And, within that strategic vision, what steps are needed to realize our destination?

The first step is to look at the climate change issue from all sides. In order to minimize the effect on our economy, we should look at all possible ways of reducing greenhouse gas emissions. For example, I have long believed that we have been short sighted in our use of nuclear power. The Energy Information Administration has stated, based on their analysis, that the utilization of nuclear power could play a very important role in reducing greenhouse gas emissions. Yet, of the \$4.4 billion requested in the President's budget, only one-half of one-percent of that is for nuclear power research initiatives.

Another important part of any strategy for addressing climate change is international applications. I am very interested in advancing international cooperation and will be interested in discussing that subject in our evaluation of the President's budget.

I hope today's hearing will help us make progress on this first step toward developing a strategic plan.
Thank you.

**STATEMENT OF HON. DAVID M. McINTOSH,
U.S. REPRESENTATIVE FROM INDIANA**

Representative McINTOSH. Thank you, Mr. Chairman, and it is in fact an honor to be here with you today. As you mentioned in your remarks, it is unusual for us, but I hope we can set a precedent where we do more of this in the House and Senate, because this is indeed a critically important issue facing our country.

The purpose of today's joint hearing is to examine the Clinton administration's compliance with recent statutory requirements governing climate change policy. We will endeavor to find the answers to two questions: First, is the Clinton administration heeding the statutory prohibition against implementing the Kyoto Protocol before it is ratified by the Senate; and second, are the Clinton administration's climate change policies, specifically the proposed spending increases in the climate change technology initiative, a prudent and effective use of taxpayer dollars?

Last fall the Congress, by a large bipartisan majority, passed a statutory provision prohibiting the Environmental Protection Agency and other agencies from issuing or proposing regulations for the purpose of implementing or in preparation for implementing the Kyoto Protocol. I am delighted that our first witness today is the author of that provision, my colleague Joe Knollenberg of Michigan.

Congress would not have taken this action if we had not thought it necessary to preserve the Senate's constitutional role in treaty-making. Let me review some recent history to show why that is important. In July 1997, the Senate passed Resolution 98, popularly known as the Byrd-Hagel resolution, by a vote of 95 to 0. That resolution advised the administration not to approve any global warming treaty that exempts developing countries, including major U.S. trade competitors like Mexico, China, South Korea, from those legally binding commitments.

But at Kyoto the administration did just that. Vice President Gore signed the Kyoto Protocol and is working to commit the United States to the policies that are in that treaty.

After negotiating that the administration requested a \$6.3 billion increase in the climate change technology initiative. Many of us viewed that as an attempt to buy off support for the Kyoto Treaty. Another problem that we had beyond the funding request was that in some of its policies, the administration clearly was driven by a desire to increase the cost of fossil-based fuels. One such policy was a 5.5 percent renewable energy mandate in the administration's electricity restructuring proposal. Documents obtained through my subcommittees revealed that it was definitely part of a plan to try to implement the Kyoto Protocol without seeking Senate ratification.

Another troubling item was the EPA General Counsel's memorandum last spring that tried to argue that carbon dioxide can be regulated under the Clean Air Act as a pollutant. Now, the common sense answer to that is that each of us suddenly becomes a

polluter since we are emitting carbon dioxide as we sit here and breathe.

But certainly the most telling sign that the administration is moving forward without Senate approval was that in November 1998 the administration actually signed the Kyoto Protocol, and this was without one key developing country agreeing to participate in a meaningful way in the treaty.

Last fall Congress passed a bill that requires the administration to tell us what results we can expect from the climate change funding that was granted in that appropriations bill. We asked the President for a discussion on how success will be measured—at a minimum an estimate of the tons of CO₂ emissions reduced.

Unfortunately, this information has not been included for most of the 44 appropriations accounts scattered across 14 agencies. I appreciate Senator Nickles working with us today on this hearing to make sure that we can conduct oversight into whether the administration is in fact meeting the statutory requirements for performance reviews.

Many of the administration's so-called performance measures claim to "assist, demonstrate, develop, document, examine, help to focus, initiative cooperative agreements, provide experience, train, test," et cetera, rather than quantify the benefits that could be expected to come from the government climate change programs.

This year the administration is requesting \$4.5 billion, including \$1 billion of new spending in the year 2000 alone. As Senator Nickles pointed out, that adds up to about \$20 billion over a 5-year budget period.

It is, I think, unconscionable for the administration not to give to Congress measures we could use to judge program success or failure if we actually grant that funding by the agencies.

So let me close by saying again, I appreciate the opportunity to join you today. I look forward to hearing from all of the witnesses on these critical questions. Climate change policy is something that affects all Americans. It affects the future of our competitive position here in America. It affects jobs. I am told the AFL-CIO estimates that Kyoto would cost us a million jobs in America.

So it is critical that we have these oversight hearings to examine the administration's compliance with congressional requirements as they implement these policies.

Thank you, Senator Nickles.

[The prepared statement of Representative McIntosh follows:]

PREPARED STATEMENT OF HON. DAVID M. MCINTOSH, U.S. REPRESENTATIVE
FROM INDIANA

The purpose of today's hearing is to examine the Clinton Administration's compliance with recent statutory requirements governing climate change policy. We will endeavor to find answers to two main questions. First, is the Clinton Administration heeding the statutory prohibition against implementing the non-ratified Kyoto Protocol? Second, are the Clinton Administration's climate change policies, specifically the spending increases requested for the Climate Change Technology Initiative, or CCTI, a prudent and effective use of taxpayer dollars?

Last Fall, the Congress, by large bipartisan majorities, passed a statutory provision prohibiting the Environmental Protection Agency (EPA) from issuing or proposing regulations for the purpose of implementing, or in preparation for implementing, the Kyoto Protocol. I am delighted that our first witness today is the author of that provision, Rep. Joe Knollenberg of Michigan. Congress would not have taken this extraordinary step—enacting a statute to safeguard the Senate's constitu-

tional role in treaty making—were there not widespread suspicions that the Administration was preparing to implement a non-ratified treaty.

Let me review some recent history. In July 1997, the Senate passed Senate Resolution 98, popularly known as the Byrd-Hagel Resolution, by a vote of 95-0. The Byrd-Hagel Resolution advised the Administration not to approve any global warming treaty that exempts developing countries, including major U.S. trade competitors like China, Mexico, and South Korea, from legally binding commitments. But, at Kyoto, the Administration did just that, flouting the Senate's will.

Shortly after negotiating the Kyoto Protocol, in February 1998, the Administration requested a \$6.3 billion increase for the CCTI—\$1.3 billion more than its October 1997, pre-Kyoto level. Many members of Congress viewed this move as an attempt to lobby businesses and consumers on behalf of the Kyoto treaty. Accordingly, later in 1998, Congress rejected many of the Administration's requested funding increases.

The Administration took other actions last year that either directly conflicted with Byrd-Hagel or indicated an intention to implement the Kyoto Protocol. One was the Administration's attempt to include a 5.5 percent renewable-energy mandate in its electricity restructuring proposal—in other words, a 5.5 percent restriction on fossil fuel electricity. Another was the EPA General Counsel's April 1998 legal memorandum, which asserted that EPA has authority, under the Clean Air Act, to regulate carbon dioxide as a "pollutant." Restricting the use of fossil energy and regulating CO₂ are what the Kyoto Protocol is all about.

Last, but surely not least, in November 1998, the Administration signed the Kyoto Protocol. The Administration took this action despite the fact that not one "key" developing country has agreed to "participate meaningfully" in the treaty. Thus, for the second time at a major international conference, the Administration disregarded the Byrd-Hagel Resolution.

This year the Administration is again requesting a \$6.3 billion increase for its climate change policy—about a \$20 billion total over five years. One of its current initiatives is a program called "credit for early action." This program would create regulatory credits from which participating companies could profit if—but only if—the Kyoto Protocol or a comparable regulatory regime were ratified or adopted. A promising initiative—if your objective is to build a pro-Kyoto business clientele. I doubt that most members of Congress want to be lobbied on behalf of a treaty that is so manifestly unfair to America and so dangerous to our prosperity.

What real benefit would taxpayers get for the Administration's climate change programs? Last Fall, out of sheer frustration trying to understand what the Administration's huge \$6.3 billion requested funding increase would achieve, Congress required that the President provide, with his Fiscal Year 2000 Budget submission, detailed information on all Federal agency funding requests for climate change programs by line item (appropriation account). Also, the President was to include, for each requested increase in funding, one or more performance measures—that is, "a discussion of how success will be measured." Well, if your goal is to reduce carbon dioxide emissions, then a meaningful performance measure will provide, at a minimum, an estimate of the tons of CO₂ emissions reduced.

The President provided some of this information on April 20—nearly three months late. The information did not include performance measures for most of the 44 appropriation accounts scattered across 14 Federal agencies. The table on display reveals that the Administration only included nine actual performance measures and that only one of the nine could be associated with a specific appropriation account. The remainder of the so-called performance measures claim to "assist," "demonstrate," "develop," "document," "examine," "help to focus," "initiate cooperative agreements," "provide experience," "support," "test," "train," etc. These measures are supposed to justify the over \$4 billion request for climate change funding in FY 2000, including over \$1 billion of new spending in that year alone.

The bottom line is that the President's huge requested climate change budget would result—according to the President's April 20 report—in a reduction of 120 million metric tons of carbon dioxide equivalent. Is that figure correct? I don't know, but I doubt it. DOE's Energy Information Administration, an independent research agency with no regulatory authority or agenda, says that it was "unable to link [CCTI] research and development expenditures directly to program results or to separate the impacts of incremental funding requested for FY 2000 from ongoing program expenditures."

But, the situation is even worse than our table suggests. Suppose the CCTI programs do reduce greenhouse gas emissions by 120 million metric tons. So what? What does that get us in terms of real human health benefits, such as a decrease in the incidence of respiratory illness? Nothing. The EIA estimates that full implementation of the Kyoto Protocol would cost anywhere from \$63 billion to \$397 billion

per year. How many public school teachers, how many hospital visits, how many mammograms would Americans have to forego to pay for the Kyoto Protocol?

As we debate the details of CCTI, we should not lose sight of the big picture. I suggest we keep three points in mind. First, the science of climate change is in its infancy. The computer models driving the whole debate are impressive in their complexity and ingenuity, but they are not accurate enough either to forecast climate change or to guide public policy.

Second, the Kyoto Protocol is based on the fantasy that politicians and bureaucrats can force the global economy fundamentally to change directions. Fossil fuels—the primary source of carbon dioxide emissions—supply 85 percent of all U.S. energy and are projected to supply 90 percent of all new electric generation in the next decade. Despite billions of dollars in ratepayer and taxpayer subsidies, less than one half of one percent of U.S. electricity comes from wind and solar power. The Kyoto Protocol is a prescription for costly failure.

Third, the Kyoto Protocol is based on the conceit that politicians and bureaucrats can forecast how people will produce and use energy in the year 2050 and beyond. The hubris of this endeavor would be funny if the consequences weren't so serious. Let us remember that some of the experts who now confidently forecast where emission levels and global temperatures will be in 2050 or 2100 warned us only two decades ago that the world would run out of oil by the year 2000. Long-term technology forecasting is a dubious business. In fact, it is folly.

Lastly, I also want to welcome the other witnesses with us today, including three Administration witnesses—from OMB, DOE, and EPA—GAO and three nongovernmental experts.

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT

Appropriation account—climate change component (CCTI, USGCRP, Other)	Actual performance measures
AGRICULTURE	
1. Agricultural Research Service—CCTI	
2. Forest Service/Forest & Rangeland Research—CCTI	
3. Natural Resources Conservation Service/Conservation Operations—CCTI	
4. Agricultural Research Service—USGCRP	
5. Cooperative State Research, Education, & Extension Services/Research & Education—USGCRP	
6. Economic Research Service—USGCRP	
7. Forest Service/Forest & Rangeland Research—USGCRP	
8. National Resources Conservation Service/Conservation Operations—USGCRP	
COMMERCE	
9. NIST/Scientific & Technical Research & Services—CCTI	
10. NOAA/Operations, Research, & Facilities/Oceanic & Atmospheric Research—USGCRP	
11. NIST/Industrial Technology Services/PNGV—Other	
12. NIST/Scientific & Technical Research & Services/PNGV—Other	
13. Under Secretary for Technology/Office of Technology Policy/PNGV—Other	

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account—climate change component (CCTI, USGCRP, Other)	Actual performance measures
ENERGY	By 2010, –36M metric tons of carbon emissions/year by DOE's building technology programs By 2010, –24M metric tons of carbon emissions/year by DOE's renewable energy programs
14. Energy Conservation R&D—CCTI	
15. EIA—CCTI	
16. Energy Supply/Nuclear Energy—CCTI	In 2000, offset 150M metric tons of carbon emissions/year
17. Energy Supply/Solar & Renewable Energy R&D—CCTI	
18. Fossil Energy R&D—CCTI	
19. Science/Basic Energy Science—CCTI	
20. Science/Biological & Environmental Research—USGCRP	
21. Energy Conservation R&D/Weatherization & State Energy Grants—Other	
22. Energy Supply/Nuclear Energy R&D/Nuclear Energy Research Initiative (NERI)—Other	
23. Fossil Energy R&D/coal/efficient combustion & utilization—Other	
24. Fossil Energy R&D/natural gas/efficient combustion & utilization—Other	
HHS	
25. NIH/National Cancer Institute—USGCRP	
26. NIH/National Eye Institute—USGCRP	
27. NIH/National Institute of Arthritis & Musculoskeletal & Skin Disorders—USGCRP	
28. NIH/National Institute of Environmental Health Sciences—USGCRP	
HUD	
29. Research & Technology/PATH—CCTI	
INTERIOR	
30. USGS/Surveys, Investigations, & Research—USGCRP	
STATE	
31. International Assistance Programs/International Organizations & Programs/Climate Stabilization Fund—Other	
TRANSPORTATION	
32. NHTSA/Operations & Research/PNGV—Other	

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account—climate change component (CCTI, USGCRP, Other)	Actual performance measures
TREASURY	
33. Tax Incentives—CCTI	
34. International Development Assistance/Multilateral Assistance/Contributions to the International Bank for Reconstruction & Development/Global Environment Facility—Other	
AID	In 2000, -1.5M metric tons of carbon emissions by AID-assisted activities in developing countries
35. Development Credit Authority/subsidy BA—Other	
36. Sustainable Development Assistance—Other	
EPA	In 2000, -12.7M metric tons of carbon emissions/year by EPA's buildings programs In 2000, -53B kilowatt hours of energy consumption by EPA's buildings programs In 2000, -5.7M metric tons of carbon emissions by EPA's transportation programs In 2000, -37.9M metric tons of carbon emissions/year by EPA's industrial programs In 2000, -1.7M metric tons of carbon emissions/year by EPA's State/local programs
37. Environmental Programs & Management—CCTI	
38. Science & Technology—CCTI	
39. Science & Technology—USGCRP	
40. State & Tribal Assistance Grants/Clean Air Partnership Fund—Other	
NASA	
41. Science, Aeronautics & Technology—USGCRP	
NSF	
42. Research & Related Activities—USGCRP	
43. Research & Related Activities/PNGV—Other	
SMITHSONIAN	
44. S&E—USGCRP	
TOTAL	9 measures in total, equaling: -119.5M metric tons of carbon emissions Offset 150M metric tons of carbon emissions -53B kilowatt hours of energy consumption

Senator NICKLES. Congressman McIntosh, thank you very much. Next we are pleased to be joined by my friend and colleague from Hawaii, Senator Akaka.

**STATEMENT OF HON. DANIEL K. AKAKA, U.S. SENATOR
FROM HAWAII**

Senator AKAKA. Thank you very much, Mr. Chairman. I thank you very much for holding this unusual joint hearing and for inviting these distinguished guests before us.

I want to talk about Hawaii, Mr. Chairman. As we know, Hawaii is an energy-dependent State. We import most of our energy from sources beyond our borders. Gasoline is expensive and we have some of the highest electricity costs in the Nation. Energy efficiency is very important to our island economy.

So Mr. Chairman, I welcome the opportunity to review the energy efficiency budget requests for fiscal year 2000 and the results of the DOE and EPA programs.

Energy efficiency has been around for a long, long time. It predates the Clinton and Bush administrations. Energy efficiency even predates climate change. Long before the word "global climate change" entered our vocabulary, the Federal Government was conducting research on energy efficient technologies. The phrase "global climate change" first appeared in the *New York Times* in May 1985. Four years earlier, back in 1981, I was working on energy efficiency programs as a member of the House Appropriations Committee.

Just because the Clinton administration has grouped these programs under the heading of climate change does not alter the fact that they are solid programs with a long and impressive track record. I urge my colleagues to focus on the accomplishments of these programs and not be distracted by the vocabulary.

I realize that climate change has become a political football that gets kicked around the halls of Congress, but there is no reason why programs with a long and proven track record should get drawn into the partisan struggle over climate change.

Hawaii has a voluntary Energy Star partnership program for commercial building owners and managers to promote energy efficiency. The program has a proven track record and a very impressive roster of public and private sector participants. It reads like a Who's Who of Businesses in Hawaii. The Bank of Hawaii, the State of Hawaii, Hilton Hawaiian Village, Kaiser Permanente, Outrigger Hotels Hawaii, and the Hawaiian Electric Co. are among 18 participants that are working with EPA to reduce their energy consumption.

To date these organizations have saved \$82 million through investments in Energy Star programs. Not only do they save money, but they enjoy environmental benefits from this voluntary program. The investments by Hawaiian companies have prevented 1.6 billion pounds of carbon dioxide from entering the atmosphere. This reduction in CO₂ emissions is equivalent to planting 218,000 acres of trees, an area greater than the island of Molokai. Nitrogen oxide and sulfur dioxide emissions have also been reduced by over 11 million pounds.

If this can happen in a small State like Hawaii, imagine what the national benefits are. EPA's annual report shows that the total investment in energy efficient technologies by the private and public sector is more than \$4 billion. The total savings for consumers

and businesses is more than \$18 billion nationwide. These are impressive figures for a voluntary program.

Mr. Chairman, in Hawaii energy is expensive. To us this discussion is not about climate change. It is about common sense programs that save energy and cut energy costs for businesses in my State.

Thank you very much, Mr. Chairman.

Senator NICKLES. Next, Senator Larry Craig.

**STATEMENT OF HON. LARRY E. CRAIG, U.S. SENATOR
FROM IDAHO**

Senator CRAIG. Mr. Chairman, thank you very much. Both you and Congressman McIntosh have outlined the purpose of this hearing today. Let me go a step further to zero in on what the Congress did last year and what the administration has not yet done in a complete form this year.

We are all struggling to assess the administration's fiscal year 1999 budget request for proposed climate change activities. As a result of that frustration, Senator Byrd and I, serving on the Appropriations Committee, and a number of other Senators worked hard to ensure that Congress would have a better way of assessing what the administration was attempting to do, and have it received prior to the year 2000 fiscal year budget process.

That way we could not only assess, Mr. Chairman, what was their intent, but we could clarify it for the budget process. The chairman of the Budget Committee, who sits to my immediate right at this moment, was very helpful in working with us to be better able to deal with fiscal year 2000 appropriations.

So as a result, the conference report of fiscal year 1999 VA-HUD went something like this:

To the extent future funding requests may be submitted which would increase funding for climate change activities prior to the Senate's consideration of the Kyoto Protocol, the administration must do a better job of explaining the components of the program, their anticipated goals and objectives, the justification for any funding increases, a discussion of how such will be measured, a clear definition of how these programs are justified by goals and objectives independent of the implementation of the Kyoto Protocol.

Now, that is the language that went out. That language we believe was consistent with the 1993 Government Performance and Results Act because we wanted to be able to measure and assess, Mr. Chairman, where we all were on this issue.

As EPA is well aware, Senator Byrd and I amended the 1998 VA-HUD appropriations Senate report by including language that initially required EPA to file a climate change program justification with Congress by December 31, 1998. That amendment also required GAO to review that report for compliance with the Results Act within 90 days of receipt.

Now, presumably at the request of the administration, Senator Byrd in a colloquy with Chairman Bond persuaded Congress that February 1, 1999, was a more appropriate date for EPA reports to Congress because that was the date the agency was required to file its budget justification for fiscal 2000. It is obvious that that sounded like a reasonable time. Here comes the budget, here comes the justifications for these expenditures.

EPA filed its report with the Senate Appropriations Committee on April 9, not February 1 but April 9. It is unlikely that we will see GAO's analysis of the filed report until Thursday, July 8, 7 months into the appropriation review process. The budget has already been struck for the year. We all know that. EPA knew it.

I have to ask the fundamental question of EPA today: In so knowing it, did you simply dodge the directive, therefore violating the intent of Congress, if not the express purpose of the law?

In addition, the Office of Management and Budget and the Department of Energy were similarly required to file their reports to Congress on climate change activities on February 1, once again consistent with the budget process, so that those of us in the budgeting business could have reasonable knowledge. OMB filed its report on April 20. DOE, I understand from staff, filed its report late yesterday afternoon.

Oops. Guess you were just a few months late. Interesting timing as it relates to the budget process and the fact that the Senate and the House have already dealt with that.

This compliance with Congress' directives is just flat unacceptable. The administration knows it. I am of the firm belief they are dodging it.

It is therefore extremely frustrating as to how we proceed. Do we proceed by writing it into the law or do we simply proceed by moving the money out of your other budgets into the areas where you sense the priorities are needed? And how does this justify itself with the Results Act as it relates to the American taxpayer and how we spend the dollar on their behalf?

Now, I am not willing to simply accept statements from agencies that all climate change programs are worth funding. With the Results Act, we try to justify for the American taxpayer why we spend the money. Proper use of the Results Act serves a number of very important purposes for a democratic governance, but most importantly it is a clear and important public justification for why we spend their money.

There is at this time no effort to attempt to do that, in my opinion, on the part of the administration. Today, unfortunately, we will not learn whether any of these important purposes have been advanced. This is because GAO in many instances does not have the complete story of the administration. The administration must learn how to effectively comply with the requirements of the Results Act and I would hope, as it relates to those of us who appropriate the money, that they would at least try to work with us in justifying the need for the kinds of dollars that both Senator Nickles and Congressman McIntosh talked about.

I am pleased that we have convened this bicameral hearing today so that we can better analyze where we are with this issue, because, Mr. Chairman, in all fairness, to date I find no justification for expending one penny for administration climate change programs because at this moment they are fully out of compliance with the intent of Congress as it relates to our directive last year in the budget.

So I would hope today to get some answers that might justify us moving forward with those requests. Having said that, I thank you

for the time and I look forward to those of you who have come to testify.

Senator NICKLES. Senator Craig, thank you very much.

Next we are pleased to be joined by Congressman Kucinich. Welcome.

**STATEMENT OF HON. DENNIS J. KUCINICH,
U.S. REPRESENTATIVE FROM OHIO**

Representative KUCINICH. Thank you very much, Mr. Chairman. As the ranking Democrat on the regulatory oversight subcommittee of the Government Reform Committee, I am pleased to be here for this important hearing, and to join my distinguished colleagues from the Senate, as well as see Mr. Knollenberg, who I had the pleasure of joining on a trip to Buenos Aires at the Conference of Parties.

The focus of this hearing is the President's climate change budget request and the administration's compliance with appropriations language. I think it is important to keep in mind that even if global warming were not a threat we should support the President's budget request. Most of the programs target energy efficiency, renewables, and research and development.

These programs are a proven success. We will hear today how five technologies developed or assisted by the DOE building program resulted in \$28 billion in energy savings over the past 20 years and how the EPA's Energy Star and Green Lights programs have already returned \$6.5 billion to the economy from an approximately one-half billion dollar investment.

An investment in energy efficiency not only reduces greenhouse gases, but saves money for both consumers and businesses, reduces our dependence on foreign oil, and significantly reduces pollution. Research by the Alliance to Save Energy found that energy efficiency gains in the past 25 years have resulted in 18 percent less pollution.

An investment in energy efficiency is also an investment in our economic future. The potential for energy efficient products and technologies over the next 15 years has been estimated to be \$84 billion.

I urge everyone to support the budget request even if you do not believe that global warming is a threat or that human activity is contributing to that threat. An investment in energy efficiency is an investment in our future.

Senator NICKLES. Congressman Kucinich, thank you very much.

Just one editorial comment. The administration's budget request of \$1 billion additional for fiscal year 2000, the budget caps that we are now wrestling with some people want to amend, but the budget caps for total discretionary spending, \$571 billion, is \$4 billion different from the previous year. To say that we are going to spend \$1 billion—if we have \$2 or \$3 billion difference between 1999 and 2000, to think that \$1 billion of it would be in climate change I think would be a mistaken hope not to be realized.

Congressman Knollenberg, thank you very much for your participation in this hearing. Also, I want to thank you for your successful passage of your amendment. Please proceed.

**STATEMENT OF HON. JOSEPH "JOE" KNOLLENBERG,
U.S. REPRESENTATIVE FROM MICHIGAN**

Representative KNOLLENBERG. Chairman Nickles, thank you very, very much, and I want to thank both you and Congressman McIntosh for holding this hearing today. I understand it is somewhat historic, and I appreciate the opportunity to testify before the various Members, distinguished all.

As a member of the congressional delegation that monitored the negotiations over the Kyoto Treaty in 1997, I have been an outspoken opponent of this agreement because I believe it would have a negative impact on the American economy and the quality of life in this country.

This fatally flawed agreement is blatantly unfair because it exempts developing nations from making any commitment to reduce their emissions of greenhouse gases. As a result, nations like China, India, Mexico, and Brazil, which are estimated to be the largest emitters of greenhouse gases in the next century, will be given a free pass while the United States is forced to struggle with the Kyoto Treaty's stringent mandates.

Make no mistake, if implemented the Kyoto Treaty will result in American jobs flowing overseas. Every credible economic study on this treaty paints a dark picture for the American people.

According to WEFA, the Wharton Econometric Forecasting Associates, the Kyoto Treaty would cause energy prices to soar and the standard of living in our country to plummet. In a well-respected study, WEFA found that the Kyoto Treaty would result in the elimination of over 2.4 million American jobs by the year 2010 and cost the average American family over \$2,700 a year.

Given the lack of sound science on global climate change, there is absolutely no justification for the United States to move forward with an agreement that would place our economy at a competitive disadvantage with our foreign competitors and erode the standard of living currently enjoyed by the American people.

Fortunately, as has been referenced, the Kyoto Treaty has received strong bipartisan opposition in Congress and the President has been unable to secure the votes he needs to win ratification in the Senate.

Nevertheless, the Clinton administration seems determined to place its own political agenda above the economic interests of the American people by pursuing a strategy of implementing the Kyoto Treaty through a series of backdoor regulations.

To prevent this stealth campaign, I led a bipartisan effort to include language in last year's budget that prevents the EPA from issuing rules or regulations to implement the Kyoto Treaty until it has been ratified by the Senate. I also included report language in last year's budget that prohibits the EPA from using taxpayer dollars to lobby for the Kyoto Treaty.

While my language is simple and straightforward, the proponents of the Kyoto Treaty have spread misinformation and created confusion over what it actually does and does not do.

Let me set the record straight. The language I included in the last year's budget prevents the EPA from misusing its existing authority to implement or prepare for the implementation of the Kyoto Treaty in advance of its ratification by the Senate.

My language does not undermine existing environmental law or cancel existing energy conservation efforts, nor does it curtail the research and development of more efficient technologies. It simply requires the Clinton administration to honor its commitment that it would not attempt to implement the Kyoto Treaty before the Senate ratifies it.

As a member of the House Appropriations Subcommittee that is responsible for the EPA's budget, I have requested that this same language be included in the fiscal year 2000 budget. Given the stakes involved, I believe Congress must remain vigilant in ensuring that the Kyoto Treaty is not rammed through the back door.

I applaud again Chairman Nickles and Chairman McIntosh for holding this hearing today and look forward to working with my colleagues on both sides in the House and the Senate on this very important issue. I want to once again thank you, Chairman Nickles, for allowing me the time and I hope I have stayed within the allotment. Thank you very much.

Senator NICKLES. Congressman Knollenberg, thank you very much. Again, my compliments to you for the homework that you have done and your committee has done and also for the legislative language.

I have no questions for the Congressman.

Representative MCINTOSH. If I could, I would like to talk with Congressman Knollenberg for a second and ask unanimous consent to put in an exchange of letters between me and Mrs. Browner and then Mr. Gardiner answering on her behalf relating to their interpretation of your amendment.*

Sadly, I was disappointed to see that the agency took a very constrained view of that amendment and seemed to be indicating that anything that was otherwise authorized in law would not be affected by it. To me that is a way of creating a statutory nullity and I certainly did not think we were intending to do that on the House floor.

But I wanted to check with you on your intention as the author. Did you anticipate that things that might come up under the Clean Air Act, like regulating carbon dioxide, would not be covered by your amendment?

Representative KNOLLENBERG. It is interesting, Mr. McIntosh, you would raise that. Absolutely not. We had no indications or signals that that would be anything that we would have to consider. In fact, we repeatedly in hearings asked that question to Ms. Browner, who comes before our subcommittee regarding EPA matters, and they insisted over and over—and I have done this with other agencies—that that was not a consideration, that was not to be included.

I am not satisfied, to give you just an editorial comment, that it does not require further watching, very, very close scrutiny.

Representative MCINTOSH. So let me make sure I understand, Mr. Knollenberg. Your impression from hearing testimony from Mrs. Browner was that with your amendment they would not be allowed to go forward with regulating CO₂ because they were not required to do that under the Clean Air Act, and that the intent

*The letters have been retained in subcommittee files.

of your amendment was to say where you are not required to move forward do not implement policies that would further the Kyoto Protocol?

Representative KNOLLENBERG. I think you said it very well. That it is precisely. If you put a period on it, I think that would say it very well.

Representative MCINTOSH. Thank you, Mr. Knollenberg.

Senator NICKLES. Anyone else?

[No response.]

Senator NICKLES. Congressman Knollenberg, thank you very much.

We now ask our next panel to come forward if they would, please.

Senator Domenici, we went ahead. Did you have any opening comments you wished to make?

Senator DOMENICI. No, thank you very much, Mr. Chairman.

Senator NICKLES. Just looking at the list, I do not know of any particular order. I think we will follow the list as outlined on the panel sheet. So Ms. Lee, if you do not mind, you would be first, Deidre Lee, Acting Deputy Director for Management, in OMB.

**STATEMENT OF DEIDRE A. LEE, ACTING DEPUTY DIRECTOR
FOR MANAGEMENT, OFFICE OF MANAGEMENT AND BUDGET**

Ms. LEE. It is a mouthful, is it not, sir?

Senator NICKLES. Yes, it is. Welcome.

Ms. LEE. Thank you. Good afternoon, Chairman Nickles, Chairman McIntosh, Mr. Kucinich, Mr. Craig, Mr. Domenici.

We are here today to discuss climate change and program performance. Since 1993 President Clinton and the Congress have put into place win-win programs to develop and deploy energy efficient technologies and to spur the development and broader use of renewable energy. On April 20, 1999, the President transmitted to Congress the report on Federal climate change expenditures, which provides Congress with a detailed account of proposed fiscal year 2000 Federal spending and performance goals for climate change programs, both foreign and domestic.

The report identifies by agency and appropriation account programs relating to climate change and summarizes program performance goals and objectives. The President's fiscal year 2000 budget proposes \$4.449 billion, an increase of \$1.031 billion over the fiscal year 1999 enacted, for spending programs and tax policies relating to addressing climate change. This funding generally falls into four major program areas.

The first area, climate change technology initiatives, is the cornerstone of the administration's efforts to stimulate the development and use of renewable energy technologies and energy efficiency products. Many of the programs included in this initiative are expansions of programs that have been in existence for years and have enjoyed good bipartisan support from the Congress. These programs make good sense as they help address other energy-related and environmental challenges, including reducing U.S. dependence on imported oil, diversifying U.S. domestic fuel and electricity supply systems, expanding U.S. exports of energy technologies, and reducing air pollution.

The fiscal year 2000 budget request also includes \$383 million as the first year for a proposed package of tax incentives to stimulate the adoption of energy efficient technologies.

The second major program area is the U.S. global change research program. Begun in 1990, the U.S. global change research program seeks to provide a sound scientific understanding of both the human and natural forces that influence the Earth's climate change system, and they do put out an annual report.

The third area of activity is the international assistance. These programs support developing country efforts to address climate change through improvements in energy efficiency, renewable energy, land use and forestry practices.

The fourth major program area is a compilation of programs. There are several programs proposed in the fiscal year 2000 budget that exist primarily for another purpose or have multiple environmental benefits, but also contribute to improving energy efficiency and reducing greenhouse gas emissions. They are included in the report so that it would be as comprehensive as possible.

Next, I would like to move to program performance measures. Regarding program performance measures relating to climate change, the details of how the performance measures were developed for specific programs administered by the Department of Energy and the Environmental Protection Agency will be addressed by Secretary Glauthier and Assistant Secretary Gardiner.

I would like to say, however, a few words about OMB's role in implementing the Government Performance and Results Act and the requirements that agencies have performance measures in their annual plans. Fiscal discipline has been a major factor in the transformation of government in recent years and this area of fiscal prudence will surely continue. GPRA is a key component in linking the allocation of resources and expected results.

These GPRA program plans provide a valuable tool for expanding the emphasis on program performance, program execution, and accountability.

OMB's effort to secure a successful implementation of GPRA has been extensive. Nearly every office in OMB is engaged in working with agencies as they prepare the plans and reports under GPRA. We believe the agencies have to make great progress in producing plans that are both used and useful.

However, this does not mean that these plans cannot be improved. The experience of other countries is that 5 or more years may be needed before performance measurement practices such as those envisioned by GPRA take full effect.

The President's report to Congress includes key performance goals formulated by the agencies for programs included in the climate change technology initiative, the U.S. global change research program and the international assistance programs relating to climate change. These performance goals are discussed in more detail in agency budget justifications and annual plans submitted to Congress earlier this year.

In closing, Mr. Chairman, I would like to reiterate what other administration witnesses have said over the past year about proposed increases in the climate change technology initiative and other related spending on programs that help reduce greenhouse

gas emissions: The administration will not implement the Kyoto Protocol without ratification based on the advice and consent of the Senate.

I would be pleased to answer any questions you may have.
[The prepared statement of Ms. Lee follows:]

PREPARED STATEMENT OF DEIDRE A. LEE, ACTING DEPUTY DIRECTOR FOR
MANAGEMENT, OFFICE OF MANAGEMENT AND BUDGET

Good afternoon, Mr. Chairman and members of the subcommittees. Your letter of invitation asked OMB to discuss: (1) agency's plans to comply and its compliance to date with specific provisions relating to climate change in the 1999 Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act and the 1999 Foreign Operations, Export Financing, and Related Programs Appropriations Act and their associated reports; and (2) program performance measures for each line item increase in funding requested in the President's FY 2000 Budget.

Before I turn to these specifics, however, I would note that since 1993 President Clinton has put into place dozens of win-win programs to develop and deploy energy efficient technologies and to spur the development and broader use of renewable energy. The Climate Change Technology Initiative announced in the President's FY 1999 Budget—accelerates these efforts through a vigorous program of tax incentives and R&D investments. Together, these mutually reinforcing efforts constitute stage one of the President's plan, which seeks to lay a solid foundation for cost-effectively meeting the challenge of climate change. Other important elements of the President's plan include: moving forward with electricity restructuring; providing companies with real credit for early reductions in greenhouse gas emissions or increased carbon sequestration; establishing a set of working partnerships with key energy-intensive sectors including autos, home building, steel, chemicals, and forest products; substantially reducing the Federal Government's own greenhouse gas emissions; and proposing a \$1.8 billion scientific research program to improve our understanding of the forces that shape the Earth's climate.

COMPLIANCE WITH FEDERAL STATUTES AND REPORTS

On April 20, 1999, the President transmitted to the Congress a detailed account of Federal spending and performance goals for climate change programs and activities, both domestic and international, as included in the President's FY 2000 Budget. This report was provided in response to Section 573 of the Foreign Operations, Export Financing, and Related Appropriations Act, 1999, as contained in the Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, (Public Law 105-277), and Senate Full Committee Report 105-251, Treasury and General Government Appropriations Act, 1999. The report is also consistent with the goals embodied in Senate Full Committee Report 105-227, Department of the Interior and Related Agencies Appropriations Act, 1999 and, Conference Report 105-769, Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 1999, since it includes information on climate change programs from agency budget justifications sent to Congress earlier this year.

Generally, when Congress directs the President to provide it with a report, OMB fulfills the role of formulating the report for the President. With respect to climate change, Congress requested a number of reports in various FY 1999 appropriations statutes and reports. The Department of Energy and the Environmental Protection Agency were directed to provide Congress with specific reports on climate change. OMB's role was to coordinate the review of these reports. With respect to the Administration's government-wide report to Congress, OMB worked with the relevant agencies to collect information on funding and performance measures to include in the report. This report was presented to the President and transmitted to Congress.

We believe that this report provides Congress with a detailed account of FY 2000 Federal spending and performance goals for climate change programs, both domestic and international, in compliance with the above mentioned statutes and reports. The report identifies by agency and appropriation account programs related to climate change, describes the major domestic technology and science programs by sector or program element, explains proposed increases in funding over FY 1999 for major program areas, and summarizes program performance goals and objectives related to climate change. It is the most comprehensive summary of the full range of Federal spending on climate change-related programs available to date. Additional information on climate change programs is available in agency budget justifications

submitted to Congress earlier this year. The following is a summary of the major components of the report.

SUMMARY OF FEDERAL CLIMATE CHANGE EXPENDITURES—FY 2000 BUDGET

The President's FY 2000 Budget proposes \$4,449 million, an increase of \$1,031 million over FY 1999 enacted, for spending programs and tax policies related to addressing climate change. This funding generally falls into four major program areas. Collectively, these areas provide a comprehensive approach to better understand and address the challenge of global climate change. The four program areas are:

Climate Change Technology Initiative. The Climate Change Technology Initiative (CCTI) is the cornerstone of the Administration's efforts to stimulate the development and use of renewable energy technologies and energy efficiency products that will help reduce greenhouse gas emissions. Many of the programs included in the initiative are expansions of programs that have been in existence for years and have enjoyed bipartisan support from Congress. Even if the threat of global warming did not exist, these programs make good sense as they help address other energy-related and environmental challenges including reducing U.S. dependence on imported oil, diversifying U.S. domestic fuel and electricity supply systems, expanding U.S. exports of energy technologies, and reducing air pollution.

The FY 2000 Budget proposes \$1,368 million in discretionary spending for CCTI, an increase of \$347 million over FY 1999 enacted. Led by the Department of Energy (DOE) and the Environmental Protection Agency (EPA), the effort also includes the Department of Agriculture, the Department of Housing and Urban Development, and the National Institute of Standards and Technology.

The FY 2000 Budget also includes \$383 million as the first year of a proposed package of tax incentives to stimulate the adoption of energy efficient technologies in buildings, industrial processes, vehicles, and power generation. The specific details on the spending and tax incentives included as part of the CCTI are discussed in the report.

U.S. Global Change Research Program. The U.S. Global Change Research Program (USGCRP) seeks to provide a sound scientific understanding of both the human and natural forces that influence Earth's climate system. Information produced by USGCRP scientists is used by national and international policy makers to make informed decisions on global change issues. This multi-agency scientific research program is coordinated through the National Science and Technology Council.

The FY 2000 Budget proposes \$1,787 million for the USGCRP, an increase of \$105 million over FY 1999 enacted. Of the amount requested, \$829 million is for scientific research and \$958 million is for NASA's development of climate monitoring satellites and ground-based observation systems. A complete explanation of the programs under the USGCRP, related funding, and key performance measures are discussed in more detail in the report.

International Assistance. International assistance programs support developing country efforts to address climate change through improvements in energy efficiency, renewable energy, land use, and forestry practices. The FY 2000 Budget proposes \$163 million, an increase of \$6 million over FY 1999 enacted, for climate change programs administered by the U.S. Agency for International Development and to support the Secretariat of the Framework Convention on Climate Change and the Intergovernmental Panel on Climate Change.

Other Climate-Related Programs. There are several programs proposed in the FY 2000 Budget that exist primarily for another purpose or have multiple environmental benefits, but also contribute to improving energy efficiency and reducing greenhouse gas emissions. These programs are not included under the Climate Change Technology Initiative, the U.S. Global Change Research Program, or as part of the international assistance component.

The programs identified in this category include EPA's new Clean Air Partnership Fund, DOE's Weatherization and State Energy Grant programs, DOE programs that promote coal and natural gas combustion and utilization and nuclear energy R&D, funding not included in CCTI that supports the Partnership for a New Generation of Vehicles initiative, and U.S. contributions to the Global Environment Facility (GEF). GEF funding helps address trans-border environmental problems like international water pollution, biological diversity conservation, and climate change. The Budget proposes \$748 million, an increase of \$190 million over FY 1999 enacted, for these programs. A complete description of the other climate-related programs are discussed in the report.

PROGRAM PERFORMANCE MEASURES

Regarding your question about program performance measures related to climate change, the details of how the performance measures were developed for specific programs administered by the Department of Energy and the Environmental Protection Agency will be addressed by Deputy Secretary Glauthier and Assistant Administrator Gardiner. I would like to say, however, a few words about OMB's role in implementing the Government Performance and Results Act (GPRA) and the requirement that agencies have performance measures in their annual plans.

As you know, Mr. Chairman, August 1998 marked the fifth anniversary of the enactment of GPRA. The past five years have seen a remarkable transformation in our Federal Government. The Federal budget has gone from being \$255 billion in deficit for FY 1993 to a surplus of over \$117 billion in FY 2000. There has been a decrease in Federal spending from 22 percent of Gross Domestic Product (GDP) to less than 20 percent during the same period. Federal civilian employment has been cut by over 330,000, or approximately 15 percent, while at the same time overall employment in the private sector grew by over 18 million.

Fiscal discipline has been a major factor in this transformation and this era of fiscal prudence will surely continue. Having such limits means that there is an increased pressure to demonstrate that money is spent to good effect and to secure the results we intend. In the midst of this era, GPRA strategic and performance plans began to emerge on a government-wide basis. These plans provide us with a valuable tool for expanding the emphasis on program performance, program execution, and accountability.

OMB's effort to secure a successful implementation of GPRA has been extensive. Nearly every office within OMB is engaged to some degree in working with agencies as they prepare the plans and reports required by GPRA. We believe the agencies have made great progress in producing plans that are both used and useful, and that OMB's efforts have significantly helped toward this end. The strategic and annual performance plans submitted to Congress have met statutory requirements. However, this does not mean these plans cannot be further improved. The experience of other countries is that five or more years may be needed before performance management practices such as those envisioned by GPRA take full effect. OMB expects the revised and updated strategic plans, which agencies will be transmitting to Congress by September 2000, to be significantly improved over the initial strategic plans. The FY 2000 annual performance plans were, on the whole, markedly better than their FY 1999 counterparts, and OMB expects further improvement in the FY 2001 annual plans.

I would point out that the President's report to Congress does include key performance goals formulated by the agencies for programs included in the Climate Change Technology Initiative, the U.S. Global Change Research Program, and the international assistance programs related to climate change. In many cases, these performance goals are discussed in more detail in agency budget justifications and annual plans submitted to Congress earlier this year. A few of the climate change performance goals are also included in the FY 2000 Government-wide plan. The report did not include performance measures for the several programs listed in the other climate-related category because these programs exist primarily for another purpose or have multiple environmental benefits, and may not have performance goals related to climate change.

In closing, Mr. Chairman, I would like to reiterate what other Administration witnesses have said over the past year about proposed increases in the Climate Change Technology Initiative and other related spending on programs that help reduce greenhouse gas emissions. The Administration has no intention of implementing the Kyoto Protocol prior to ratification with the advice and consent of the Senate. Even if the threat of global warming did not exist, the Administration believes that these programs make good sense because they help our country address other energy-related and environmental challenges.

I will be pleased to answer any questions members may have.

Senator NICKLES. We will hold you to that last comment.

Our next panelist is Peter Guerrero, Director of Environmental Protection Agency, the GAO.

STATEMENT OF PETER F. GUERRERO, DIRECTOR, ENVIRONMENTAL PROTECTION ISSUES, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION, GAO, ACCOMPANIED BY MARTIN FITZGERALD, ASSOCIATE GENERAL COUNSEL

Mr. GUERRERO. Thank you. Chairman Nickles and Chairman McIntosh. I thank you for this opportunity to testify today on certain congressional directives relating to climate change programs. Specifically, I will comment on the administration's April 20 report on Federal expenditures for climate change and the prohibition on EPA expenditures for regulatory activities that would implement the Kyoto Protocol, commonly referred to as the Knollenberg amendment.

In summary, we found the following. First, although the administration's April 20 report contains a detailed accounting of Federal programs and activities related to climate change, it was submitted 2½ months late. This report in most cases does not link the discussion of activities and performance goals to specific line items in the President's budget, making it difficult to use. Finally, it does not provide a clear picture of what results we can expect from the dozens of climate change programs in the President's budget.

Second, our review of the legislative history of the Knollenberg amendment finds that the act does not constrain the agency's ability to undertake activities that are otherwise authorized by law.

Now I would like to discuss our work in greater detail, focusing first on the April 20 report. This report provides detailed information on climate change programs and activities across some 14 Federal agencies. It was intended to accompany the President's budget, providing, among other things, a comprehensive picture of what results the Congress could expect from any increased funding of climate change programs. However, it was issued late.

Furthermore, its usefulness is limited in the following ways: First, the report's discussion of climate change activities and the performance goals set out in the report are organized by programs or groups of programs. This organization does not correspond to either the line items in the President's budget nor entirely to the spending tables in the report itself.

For example, the discussion of EPA's activities and performance goals is organized under six programs or groups of programs, such as those pertaining to buildings, transportation, or industry. However, the applicable budget line items for EPA include environmental programs and management, science and technology, and State and tribal assistance grants.

As a result of this organizational inconsistency, Congress will have a hard time identifying line items in the President's budget, for example those with large dollar amounts or those for which an increase in funding is being requested, and linking them to expected climate change activities and programs. Including a crosswalk or a connection between the programs as discussed in the report and the budget line items would have made this report more useful.

Second, the report does not always provide a clear picture of intended performance. There are in turn four weaknesses in this regard.

First, the lack of performance goals is not always explained. The administration's report organizes its discussion of climate change activities around 32 programs or groups of programs. We found that the report contained performance goals for only 19 of these 32 programs. The report does not explicitly state why performance goals were not provided or were not considered appropriate for the other 13 programs, although 6 of the 13 programs are identified as being indirectly related to climate change.

Second, relatively few performance goals were expressed in quantifiable terms. An example of quantifiable environmental goals would be reducing lead emissions by 80 percent. This should in turn reduce the amount of lead in children's blood, in turn leading to better children's health. About two-thirds of the performance goals in the April 20 report were not expressed in such quantifiable terms.

For example, one goal is to "use ecosystem scale experiments involving increased carbon dioxide to determine how climatic change may affect forest productivity." Although it may be possible to determine whether these activities actually occurred, they are difficult to use to assess the program's progress toward achieving their longer term goals and overall purpose, and because such goals—if stated in this type of way—would involve different activities each year overall program progress may be hard to measure.

Third, relatively few goals in the document are results-oriented. As in the blood lead level example I cited, performance goals are most useful if they are expressed as outcomes and are quantifiable. Outputs are the direct products and services delivered by a program, such as a regulation, inspection, or enforcement action. Outcomes, on the other hand, are the results of these products and services, such as less air or water pollution.

While it is appropriate to have a mixture of outcome and output goals, the administration's report contains a relatively small percentage of outcome-oriented performance goals. By our count, 11 of the 78 performance goals set out in the report are outcome-oriented. In addition, five of the goals are for the year 2010, which may be too far away for congressional decisionmakers to judge the intended performance for the funds that are being requested for next year.

My last point on the April 20 report is that baseline and trend data are missing. Baseline and trend data provide a context for drawing conclusions about whether performance goals are reasonable and appropriate. Decisionmakers can also use such data to gauge how the programs' anticipated performance levels compare with past performance. My written statement provides an example of how baseline and trend data can be used to provide a more complete picture.

Finally, Mr. Chairman, we looked at the application of the provision in the VA-HUD Appropriations Act that prohibits the EPA from issuing rules, regulations, orders, or decrees designed to implement or to prepare to implement the Kyoto Protocol, commonly referred to as the Knollenberg amendment. As you know, the scope of this provision was both clarified and narrowed during the legislative process. Thus, an EPA activity justified by some other au-

thority, even if it also facilitated the implementation of the protocol, would not be prohibited by the provision.

This concludes my prepared statement. I would be pleased to answer questions. Thank you.

[The prepared statement of Mr. Guerrero follows:]

PREPARED STATEMENT OF PETER F. GUERRERO, DIRECTOR, ENVIRONMENTAL PROTECTION ISSUES, RESOURCES, COMMUNITY, AND ECONOMIC DEVELOPMENT DIVISION

Messrs. Chairmen and members of the committees:

Our testimony today discusses activities relating to climate change programs. Specifically, it responds to your request that we comment on (1) the administration's April 20, 1999, report¹ on federal expenditures for climate change activities and (2) a limitation—set forth in the Environmental Protection Agency's appropriations act for fiscal year 1999—that was designed to prevent the agency from taking specified regulatory actions to implement the Kyoto Protocol on climate change.

In summary, we found the following:

- The administration's report, as required by law, provides multi-year spending data and describes climate change programs and activities. However, it was delivered to the Congress on April 20, 1999, about 2½ months after the specified due date. Also, the report did not always link its discussion of activities and performance goals to the specific line items shown in the President's budget. Finally, the report did not always provide a clear picture of intended performance across federal climate change activities, for example, by specifying—in measurable and quantifiable terms—the outcomes expected to be achieved by federal spending.
- A provision in the Environmental Protection Agency's appropriations act for fiscal year 1999 prohibited the agency from taking certain regulatory actions—for example, proposing regulations—to implement the Kyoto Protocol on climate change. To assess the scope of the prohibition, we reviewed the legislative history of the act. Based on this review, we believe that act does not limit the agency's ability to undertake activities that are otherwise authorized by law. (See the appendix for an analysis of this issue.)

BACKGROUND

Climate change policy has been a key congressional concern recently, focusing especially on the Kyoto Protocol, which was agreed to—in principle—by the United States and 37 other countries in December 1997. Under the protocol, the United States agreed to substantially reduce its greenhouse gas emissions during the 5-year period beginning in 2008. The protocol will become binding upon the United States only if the Senate ratifies it. The protocol would amend the United Nations Framework Convention on Climate Change, which was agreed to in 1992 and ratified by the Senate in the same year. Under the convention, the voluntary goal for the United States is to reduce greenhouse gas emissions by 2000 to their 1990 level. Under the Kyoto Protocol, the requirement for the United States would be to reduce emissions to 7 percent below their 1990 level. Meeting this target would require a reduction of 30 percent relative to the level of emissions that would otherwise be anticipated in 2010, the midpoint of the 5-year period (2008-12), according to the Energy Information Administration.²

In February 1998, as part of the fiscal year 1999 budget submission, the President proposed a Climate Change Technology Initiative, designed to reduce greenhouse gas emissions. Among other things, the initiative proposed additional funding primarily for (1) the Department of Energy's research and development activities; (2) tax credits—to be administered by the Department of the Treasury—to encourage the purchase of certain energy-efficient cars and houses, among other things; and (3) EPA's voluntary programs to encourage businesses and others to conserve energy. The President also proposed increased funding for the U.S. Global Change Research Program, which includes efforts by the National Aeronautics and Space Administration and other agencies to study climate change.

As part of the fiscal year 1999 appropriations process, the Congress included a number of mandates (in laws) and directives (in committee reports) to various executive agencies. One law, enacted in October 1998, required the President to provide detailed information on climate change programs and activities. The law also states

¹ *Report to Congress on Federal Climate Change Expenditures*, Apr. 20, 1999.

² Energy Information Administration, *International Energy Outlook—1999*, 1999, Table 20.

that this should be provided in conjunction with the President's budget submission for fiscal year 2000. That budget was transmitted to the Congress on February 1, 1999. A complementary Senate committee report directed the administration to provide the Congress with a detailed plan for implementing key elements of the President's proposal on climate change. In response to the law and committee report, the President transmitted a report to the Congress on April 20, 1999. Another law—providing appropriations for EPA for fiscal year 1999—was designed to prevent EPA from taking certain regulatory actions, for example, proposing regulations, to implement the Kyoto Protocol.

To assess the April 20 report, we reviewed agencies' budget documents. We also compared the report with an August 1998 report by the Congressional Budget Office (CBO), which was prepared, in part, to document current U.S. efforts in the area of global climate change.³ We did not independently verify the expenditure information or performance measures in the April 20 report. To assess the spending limitation, we reviewed the law and its legislative history and discussed these matters with officials at EPA. We performed our work in April and May 1999 in accordance with generally accepted government auditing standards.

THE REPORT PROVIDED THE INFORMATION REQUIRED BY LAW BUT ONLY SOME INFORMATION ON PERFORMANCE GOALS

The administration's April 20 report, as required, provides detailed information on climate change programs and activities. In addition, as directed in a Senate committee report, the April 20 report, in some but not all cases, (1) linked its discussion of activities and performance goals to the specific line items shown in the President's budget, and (2) provided a clear picture of intended performance across federal global climate change activities.

The requirement for the report is contained in the Omnibus Consolidated and Emergency Supplemental Appropriations Act, enacted in October 1998.⁴ That act required the administration to provide a detailed accounting of federal obligations and expenditures for climate change programs and activities. The report was to cover domestic and international activities for fiscal years 1998 and 1999 and any plan for programs thereafter related to the Kyoto Protocol. The report was also required to include an accounting of expenditures by agency, with each agency identifying climate change activities and associated costs by line item, as presented in the President's budget.

In addition, a Senate report directed the administration to provide the Congress with a detailed plan for implementing key elements of the President's proposal on climate change.⁵ The plan was to include performance goals for the reduction of greenhouse gases that had objective, quantifiable, and measurable target levels and was to provide evidence on the effectiveness of these programs in meeting the performance goals. In setting out this directive, the report said that the administration must do a better job of explaining the components of the programs, their anticipated goals and objectives, the justification for any funding increases, a discussion of how success would be measured, and a clear definition of how these programs were justified by goals and objectives that were not linked to implementing the Kyoto Protocol.⁶

THE REPORT, AS REQUIRED, PROVIDES DETAILED INFORMATION ON PROGRAMS

The administration's report provides a detailed accounting of domestic and international expenditures on climate change. It does so in several ways. For example, it distinguishes activities that are directly related to climate change, such as the U.S. Global Change Research Program, from activities that are not directly related, such as the Department of Energy's weatherization and state energy grant programs. It also lists programs and tax policies related to climate change, by appropriation account. This listing shows line items for 14 departments or agencies, including the Department of Energy, EPA, and 12 others.

³ CBO, *Climate Change and the Federal Budget*, Aug. 1998.

⁴ P.L. 105-277, Oct. 21, 1998, sec. 573(b).

⁵ S. Rept. 105-251, "Treasury and General Government Appropriation Bill, 1999," July 15, 1998, p. 6.

⁶ Language about the need to improve budget submissions appears in two other congressional reports. See H. Rept. 105-769, "Making Appropriations for the Department of Veterans Affairs and Housing and Urban Development, and for Sundry Independent Agencies, Boards, Commissions, Corporations, and Offices for the Fiscal Year Ending September 30, 1999, and for Other Purposes," Oct. 5, 1998, p. 274. Also, see S. Rept. 105-227, "Department of the Interior and Related Agencies Appropriations Bill, 1999," June 26, 1998, p. 7.

To check the completeness of the administration's report, we compared it against a similar CBO report, prepared at the request of Senate Committee on the Budget and issued in August 1998. We found that the two reports generally identified the same programs as being directly related to climate change. One exception is that CBO includes activities under the Montreal Protocol because of the "close link" between ozone-depleting gases (addressed by the Montreal Protocol) and greenhouse gases (addressed by climate change programs), but the administration's report does not include those activities.

For programs that are classified in both reports as indirectly related to climate change, there are similarities and differences between the reports. For example, both reports include the Department of Energy's weatherization and state energy grant programs. But only CBO includes the Department of Transportation's Congestion Mitigation and Air Quality Improvement Program.

THE REPORT WAS NOT ISSUED ON TIME

The act required the report to be provided with the President's submission of the fiscal year 2000 federal budget, which occurred on February 1, 1999.⁷ The accompanying Senate report stated that the administration's report was expected to be included as part of the affected agencies' fiscal year 2000 budget submissions, which also occurred in early February 1999. Because the report was issued on April 20, 1999, it was not available to the Congress for the first 2½ months of annual budget process, although it was available for the balance of the process.

THE REPORT WAS NOT ALWAYS LINKED TO THE PRESIDENT'S BUDGET

As required by law, the administration's report provides a detailed accounting of federal spending for climate change programs and activities, both domestic and international. In a series of tables, it provides this information by agency and by line item in the President's budget, as specifically required by the act. It also provides the information by program or program element. However, the report's discussion of climate change activities and the performance goals set out in the report are organized by program or group of programs. This organization does not correspond to either the line items in the President's budget nor completely to the tables in the report itself on spending by program or program element.

For example, the discussion of EPA's activities and performance goals is organized by program or group of programs as follows: (1) buildings programs; (2) transportation programs; (3) industry programs; (4) carbon removal programs; (5) management, planning, analysis, and outreach programs; and (6) Clean Air Partnership Program. The report presents three line items for EPA: (1) environmental programs and management; (2) science and technology; and (3) state and tribal assistance grants—Clean Air Partnership Fund.

This organizational inconsistency limits the report's usefulness. For example, congressional and other users of the report cannot identify line items in the President's budget—for example, those with large dollar amounts or those for which an increase in funding is being requested. Nor can users easily identify in the report what activities are planned and what performance goals have been established. Including a crosswalk, or a connection, between the programs as discussed in the report and the budget line items would have made the report more useful.

THE REPORT DID NOT ALWAYS PROVIDE A CLEAR PICTURE OF INTENDED PERFORMANCE

The administration's report sets out 78 performance goals for its climate change activities across the various programs discussed in the report. In covering this wide range of activities, the report did not provide complete information to congressional decisionmakers on the results to be achieved for the proposed level of resources. Specifically, the report did not:

- explain why certain programs were discussed, even though no performance goals were established for them;
- establish quantifiable goals in all cases;
- establish results-oriented goals in all cases; and
- provide baseline and trend data to support these goals.

However, we recognize that establishing useful performance goals for research programs can be especially challenging.

Lack of performance goals was not always explained. The administration's report organizes its discussion of climate change activities around 32 programs or groups

⁷ Because the law requiring this report was enacted on Oct. 21, 1998, the administration had less than 3½ months to prepare the report.

of programs—17 under the Climate Change Technology Initiative, 7 under the U.S. Global Change Research Program, 2 under international assistance, and 6 that are indirectly related to climate change. In some cases, individual programs under the groups of programs are briefly discussed. However, the performance goals set out in the report generally apply to the groups of programs.

We found that the report contained performance goals for 19 of the 32 programs or groups of programs, but not for the 13 others. Among the programs lacking performance goals are the Department of Housing and Urban Development's Partnership for Advancing Technology in Housing program, Energy's fossil energy programs, and the six programs indirectly related to climate change.⁸ The report does not explicitly state why performance goals were not provided or were not considered appropriate for these programs.

The report does note that the six programs indirectly related to climate change exist primarily for another purpose, such as energy conservation, or have multiple environmental benefits, but have the additional effect of reducing fossil fuel use. For these programs, it is understandable that the performance goals would have been expressed in terms of their primary purpose, such as energy conservation, and not necessarily included in this report. For the other programs, the rationale for omitting performance goals is not as clear.

About one-third of performance goals were expressed in quantifiable terms. Performance goals help translate agencies' uses of resources into results by establishing target levels for performance expressed as tangible, measurable objectives against which actual achievement can be compared. If performance goals and measures include a quantifiable, numerical target level or other measurable value, they more easily allow for progress toward the goal to be assessed. An example of a quantifiable goal would be reducing by 80 percent the amount of lead in the air or reducing by 15 percent the number of children with dangerous levels of lead in their blood.

About two-thirds of the performance goals were not expressed in quantifiable terms. For example, one goal for fiscal year 2000 is to "use ecosystem-scale experiments involving increased CO₂ [carbon dioxide] and other environmental factors to determine how atmospheric change and potential climatic change may affect forest productivity, forest health, and species distributions." Another goal for the same year is to "document land-use and land-cover change in regions where rapid change could potentially alter the sensitivities/vulnerabilities of the region to climate change." Although it may be possible to determine whether these goals actually occurred, they are difficult to use to assess the programs' progress toward achieving their longer-term goals and overall purposes. Because such goals would involve different events each year, overall progress may be hard to measure.

About one-seventh of goals are results-oriented. Performance goals are most useful to congressional and other decisionmakers in judging the results to be achieved for a proposed level of resources if they are expressed as program outcomes and are quantifiable. Outputs are the direct products and services delivered by a program, such as a regulation, inspection, or enforcement action. Outcomes are the results of these products and services.

Outcome goals could be expressed in terms such as reductions in the number of people developing respiratory diseases or cancers or dying as a result of being exposed to pollutants in the air. Performance goals based on target levels of reductions in air pollutants would also be outcome goals. These intermediate outcome goals are not as reflective of the program's ultimate purpose, but may be the best an agency can do if sufficient data on health and environmental effects are not available.

While it is appropriate to have a mixture of outcome- and output-oriented performance goals, the administration's report contains a relatively small percentage of outcome-oriented performance goals. By our count, 11 (or 14 percent) of the 78 performance goals set out in the report are outcome-oriented. All of these are goals for intermediate outcomes—such as reduced emissions of greenhouse gases believed to contribute to or cause global climate change—rather than ultimate outcomes—such as effects on health and the environment. However, given the state of our understanding of climate change science, these intermediate outcome goals may be appropriate at this time. In addition, five of the goals are for the year 2010, which may be too far away for congressional decisionmakers to judge the intended performance for the funds that are being requested for fiscal year 2000.

Baseline and trend data were not provided. Baseline and trend data also provide a basis for comparing the actual results of a program with the performance goals.

⁸Other programs for which no goal was established are the National Institute of Science and Technology's industry programs; the carbon sequestration or removal programs of the Departments of Agriculture and Energy and EPA; and Energy's programs related to the management, planning, and analysis of its climate change activities.

These data would provide a context for drawing conclusions about whether performance goals are reasonable and appropriate. Decisionmakers could also use such data to gauge how the programs' anticipated performance levels compare with past performance. The administration's report, however, does not include either baseline or trend data.

An example of the usefulness of such data is the Department of Transportation's fiscal year 2000 performance plan under the Government Performance and Results Act. That plan includes graphs that show baseline and trend data, as well as the targets for fiscal years 1999 and 2000, for nearly all of its performance goals and measures. For instance, the performance goal for hazardous materials incidents is to reduce the number of serious hazardous materials incidents in transportation to 411 or fewer in 2000 from a peak of 464 in 1996. The goal has a graph that shows the number of serious hazardous materials incidents in transportation from 1985 through 1997 and target levels for fiscal years 1999 and 2000.

Establishing useful performance goals for research programs can be especially challenging. More than half of the performance goals are for activities related to research and development. During our reviews of the implementation of the Government Performance and Results Act, we have found that federal agencies have had difficulty measuring research annually and providing quantitative measures of the useful outcomes of research. Earlier this year, the Committee on Science, Engineering, and Public Policy issued a report that may be helpful to the agencies as they work to develop more useful performance goals and measures for their research activities.⁹ The study's purpose was to identify and analyze the most effective ways of assessing the results of research and to help the federal government determine how its agencies can better incorporate research activities into strategic and performance plans and improve the management and effectiveness of research programs.

After holding a series of workshops, the committee concluded that research programs, no matter what their character and goals, can be evaluated meaningfully on a regular basis in accordance with the spirit and intent of the Results Act. The committee said that, if, for example, Energy adopted the goal of producing cheaper solar energy, it could annually measure the results of the research designed to decrease the cost of solar cells against specific milestones. Basic research, on the other hand, requires a different method of assessment since the ultimate outcomes are seldom identifiable while the research is in progress. For this reason, the committee suggested a three-pronged expert review process that may apply to many of the climate change research programs. We anticipate that the guidance provided by this report will help agencies develop more meaningful performance goals and measures for research programs and activities.

This concludes our prepared statement. We would be pleased to respond to questions from you or members of the committees.

APPENDIX

ANALYSIS OF THE LIMITATION ON EPA EXPENDITURES

A proviso in the appropriations act that provides fiscal year 1999 funds for EPA states that those funds may not be used for certain purposes related to the Kyoto Protocol.¹⁰ Specifically, the law says that funds shall not be used "to propose or issue rules, regulations, decrees or orders for the purpose of implementation, or in preparation for implementation" of the Kyoto Protocol.

The scope of the proviso was both clarified and narrowed during the legislative process. First, the scope of the proviso was clarified in the conference report discussion, to make it clear that the limitation applies to those activities of EPA that are predicated "solely" on implementing, or preparing to implement, the Kyoto Protocol.¹¹ Thus, an EPA activity justified by some other authority, even if it also facilitated the implementation of the protocol, would not be covered by this proviso.

Also, the scope was narrowed during the legislative process. The House-passed version would have prohibited EPA from using funds to "develop, propose, or issue"

⁹ Committee on Science, Engineering, and Public Policy of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine, *Evaluating Federal Research Programs: Research and the Government Performance and Results Act*, 1999.

¹⁰ P.L. 105-276, "Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 1999," Oct. 21, 1998.

¹¹ H. Rept. 105-769, Conference Report, "Making Appropriations for the Department of Veterans Affairs and Housing and Urban Development, and for Sundry Independent Agencies, Boards, Commissions, Corporations, and Offices for the Fiscal Year Ending September 30, 1999, and For Other Purposes," Oct. 5, 1998, pp. 273 and 274.

rules “in contemplation of implementation” of the Kyoto Protocol. However, the law, as enacted, prevents EPA only from using funds to “propose or issue” rules whose purpose is implementation, or “preparation” for implementation, of the protocol. The law, as enacted, is thus narrower in two respects. First, it prohibits EPA from proposing or issuing rules, rather than more broadly preventing EPA from developing rules. Second, the prohibition extends only to “preparation” for implementing the Protocol, rather than “contemplation” of its implementation. Accordingly, the final statutory language would apply only to proposing or issuing rules or similar requirements having a demonstrable relationship to implementing the protocol.

In summary, in light of the clarification and narrowing of the proviso’s scope during congressional consideration, we conclude that the limitation does not preclude EPA from engaging in activities that are otherwise authorized by law.

Senator NICKLES. Mr. Guerrero, thank you very much.

Our next panelist—and I will inform the panelists, I asked staff to give you a couple of more minutes, so we are shooting for 7 minutes, and we will give you some flexibility if you need it—is T.J. Glauthier, Deputy Secretary, Department of Energy.

Mr. Glauthier.

**STATEMENT OF T.J. GLAUTHIER, DEPUTY SECRETARY,
DEPARTMENT OF ENERGY**

Mr. GLAUTHIER. Thank you very much. Chairman Nickles, Chairman McIntosh, Mr. Craig, Mr. Domenici, Mr. Kucinich. I am pleased to be here to join with you in this hearing.

Since 1993, President Clinton has put into place dozens of beneficial programs to develop and deploy energy efficient technologies and spur the development and broader use of renewable energy. The Climate Change Technology Initiative announced in 1998 accelerates these efforts through a vigorous program of tax incentives and R&D investments. Together, these mutually reinforcing efforts constitute stage one of the President’s climate change plan, which seeks to lay a solid foundation for cost-effectively meeting the challenge of climate change.

I believe the common ground in climate change debate is technology. From industry to public interest groups, there is agreement that substantial industry and government support for energy R&D is a key element for an effective response to climate change independent of opinions about the science or diplomacy of the issue.

The technology investments that are embedded, embodied in DOE’s climate change technology initiative are good strong programs on several grounds. They will enhance our national energy security by reducing our dependence on foreign oil. They will also maintain and strengthen our international competitiveness by reducing energy costs in our key industries, and they will help our industries develop a strong competitive position in the growing worldwide market for new energy efficient equipment in both the energy supply and energy use fields.

Technology is also the key to ensuring meaningful participation of developing nations in a climate treaty. It is technology that will provide developing nations with the ability to grow their economies and at the same time limit their greenhouse gas emissions and reduce the traditional air pollutants choking many of their cities. And clean technology will help ensure that developing countries become a business opportunity rather than a diplomatic challenge for our Nation.

Over the next four decades, developing countries alone will require new electricity generating capacity worth more than \$3 trillion. In order to meet this explosive energy demand and reap the resulting technology sales and jobs, we must invest now in the research, development, and deployment of energy technologies.

Mr. Chairman, our programs have accomplished a great deal, but the opportunities and the challenges of the next decade loom large. Our fiscal year 2000 budget is carefully designed to seize these opportunities and confront these challenges. To cite just a few examples: by helping the U.S. steel industry compete against foreign imports by radically reducing energy costs; by helping U.S. agriculture, which is in crisis in many parts of the Nation, to find new outlets for its crops and wastes to produce power, fuels, and chemicals; by helping the U.S. automobile industry and its workers lead the world in the production of high efficiency, low emission cars, trucks, minivans, and sport utility vehicles; by helping our coal and natural gas industries by developing new power generating technologies which will be more efficient than existing technologies and which can produce power with about 40 percent less carbon emissions than conventional technologies using those fuels; by developing our carbon sequestration program, which is targeted at both capture and control systems associated with advanced power cycles, as well as approaches which will enhance natural sinks for greenhouse gases; by helping our nuclear industry by continuing our nuclear R&D program to extend the lives of well-run plants and to advance the design of a generation of passively safe reactors; and by helping U.S. appliance and equipment makers build more efficient, economical products.

All of these benefits we can deliver—cost savings, pollution reduction, productivity gains, and energy security—require significant investment from both government and industry in research and development and deployment. In the last 6 years, the Department of Energy has made great strides in strategic planning and performance-based management. This is of course an evolving process in which we will continue to refine our performance measures.

We do have performance measures for each of our programs, which number in the hundreds. We have consolidated them to 220 measures in our Government Performance and Results Act annual performance plan and over 200 of those are in the Secretary's performance agreement with the President.

While we continually strive to improve the system, our progress makes me confident that our climate change technology initiative, if supported by the Congress, will be good for energy security, good for the economy, and good for the environment.

Mr. Chairman, thank you for the opportunity to testify.

[The prepared statement of Mr. Glauthier follows:]

PREPARED STATEMENT OF T.J. GLAUTHIER, DEPUTY SECRETARY,
DEPARTMENT OF ENERGY

Mr. Chairman and members of the subcommittees, I appreciate the opportunity to appear before you to discuss the Department of Energy's FY 2000 budget request related to Climate Change.

Before I turn to a description of our budget request, however, I would like to note that since 1993 President Clinton has put into place dozens of win-win programs to develop and deploy energy efficient technologies and spur the development and broader use of renewable energy. The Climate Change Technology Initiative—an

nounced in 1998—accelerates these efforts through a vigorous program of tax incentives and R&D investments. Together, these mutually reinforcing efforts constitute stage one of the President's Climate Change plan, which seeks to lay a solid foundation for cost-effectively meeting the challenge of climate change. Other important elements of the President's plan include: moving forward with electricity restructuring; providing companies with real credit for early greenhouse gas emissions reduction or increased carbon sequestration; a set of working partnerships with key energy-intensive sectors including autos, home building, steel, chemicals, and forest products; substantially reducing the Federal government's own greenhouse gas emissions; and a \$1.7 billion scientific research program to improve our understanding of the forces that shape the Earth's climate.

DOE CLIMATE CHANGE RELATED FY 2000 BUDGET REQUEST

The President's FY 2000 Budget for DOE programs related to Climate Change proposes \$1,674 million, an increase of \$252 million over FY 1999 appropriated levels. This funding generally falls into three major program areas: the Climate Change Technology Initiative, the U.S. Global Change Research Program and Other Departmental Climate-Related Programs. Collectively these areas provide a comprehensive approach to better understanding and addressing the challenge of global climate change.

Climate Change Technology Initiative (CCTI). The CCTI is the cornerstone of the Administration's efforts to stimulate the development and use of renewable energy technologies and energy efficient products that will help reduce greenhouse gas emissions. Led by the Department of Energy (DOE) and the Environmental Protection Agency (EPA), the effort also includes the Department of Agriculture, the Department of Housing and Urban Development, and the National Institute of Standards and Technology. The FY 2000 Budget for DOE proposes \$1,124 million for CCTI, an increase of \$222 million over FY 1999 enacted.

Included in the Department's CCTI portfolio is funding for the DOE Office of Energy Efficiency and Renewable Energy (EERE), the Office of Nuclear Energy, the Office of Science and the Office of Fossil Energy. Taken as a whole, these programs will help reduce U.S. greenhouse gas emissions while cost effectively addressing long-standing national priorities—improving energy security, improving local air quality and increasing energy savings. Funding for the CCTI covers the four major sectors of the economy contributing to carbon emissions—buildings, transportation, industry, and electricity—as well as carbon sequestration.

U.S. Global Change Research Program. The United States Global Change Research Program (USGCRP) seeks to provide a sound scientific understanding of both the human and natural forces that influence the Earth's climate system. The information produced by USGCRP's scientists is used by national and international policy makers to make informed decisions on global change issues. The FY 2000 Budget for DOE proposes \$125 million for the USGCRP, an increase of \$11 million over FY 1999 enacted.

Other Climate-Related Programs. There are several programs proposed in the FY 2000 Budget that have multiple environmental benefits and also contribute to improving energy efficiency and reducing greenhouse gas emissions. The programs identified in this category include Weatherization and State Energy Grants, programs that increase the efficiency of coal and natural gas combustion and utilization, and nuclear energy R&D. The FY 2000 Budget proposes \$425 million, an increase of \$19 million over FY 1999 enacted, for these programs.

Virtually all of the CCTI efforts within DOE are expansions of existing programs previously that have historically enjoyed bipartisan Congressional support. In planning the Initiative, an interagency team identified ongoing programs that had the greatest potential to significantly reduce greenhouse gas emissions while meeting other national energy and environmental goals.

TECHNOLOGY IS KEY IN THE CLIMATE CHANGE DEBATE

Mr. Chairman, I believe the common ground in the climate change debate is technology. From industry to public interest groups, there is agreement that substantial industry and government support for energy R&D is a key element of an effective response to climate change, independent of opinions about the science or diplomacy of the issue. In 1997, a peer-reviewed study conducted by five national laboratories recognized that the United States can hold down the costs of meeting climate change goals by developing clean energy technologies. In fact, the study concluded that significant progress in reducing greenhouse gas emissions can be achieved without increasing the nation's total energy bill.

Technology is a key to ensuring the meaningful participation of developing nations in a climate treaty. It is technology that will provide developing nations with the ability to grow their economies, and at the same time limit their greenhouse gas emissions and reduce the traditional air pollutants choking many of their cities. And, clean technology will help ensure that developing countries become a business opportunity rather than a diplomatic challenge for our nation. Mr. Chairman, over the next four decades, developing countries alone will require new electricity generating capacity worth more than \$3 trillion. In order to meet this explosive energy demand and reap the resulting technology sales and jobs, we must invest now in the research, development, and deployment of energy technologies. U.S. companies and workers can have the largest piece of this huge market if we win the R&D race. But, if our commitment to energy technology R&D is stalled by finger-pointing over back door implementation, then the U.S. economy, our citizens, and the global environment will be the real losers.

DEPARTMENTAL GOALS AND PERFORMANCE MEASURES

Over the last six years, DOE has established an initial system of strategic goals, quantitative metrics and detailed performance measures for these programs. These actions will aid strong internal management, effective stewardship of taxpayer dollars and compliance with the Government Performance and Results Act. The major DOE programs within the CCTI—renewable energy, transportation efficiency, industrial efficiency, buildings efficiency, federal energy management, fossil energy, nuclear energy and science research—have broad strategic goals, detailed estimates of expected results (quantitative metrics) and detailed program performance measures that allow us to continuously measure progress toward our goals and redirect our programs when necessary. The strategic goals, quantitative metrics and program performance measures form an information hierarchy that enables the Department to not only effectively manage our ongoing efforts, but to manage proposed increases as well.

At the highest level of this information hierarchy, our strategic goals describe how DOE efforts will address our national energy and environmental challenges. These goals are taken from the DOE Strategic Plan and the Comprehensive National Energy Strategy—both developed with extensive external input. The development of these strategic goals is informed by extensive studies of technology opportunities and challenges as well as detailed analysis of potential benefits of alternative investments.

At the next level of this hierarchy, the quantitative metrics detail the level of energy savings or production, emissions reductions and energy cost savings that will result from achieving the strategic goals. At the base of the hierarchy are literally hundreds of year-by-year program performance measures for specific programs that enable the Department to measure progress toward strategic goals and quantitative metrics. They are also the foundation of the annual Performance Agreements between the Secretary and the President and between the DOE Program Secretarial Officers and the Secretary.

Pursuant to the Government Performance and Results Act (GPRA), the Department has prepared a strategic management plan for implementing its key elements of the President's budget request. The focus of our plan is technologies; for each group of technologies we have provided details on mission, strategy, goals and performance measures for both the budget year and the longer term. Our performance goals include carbon emissions reductions as well as estimates of benefits for our strategic energy and economic goals embodied by total primary energy displaced and energy cost savings to the public. The goals are objective, quantified and measurable. We have also provided estimates of benefits and described accomplishments achieved through the proposed budget year as evidence of the technology's potential effectiveness to meet the performance goals.

SUMMARY OF DEPARTMENTAL CLIMATE CHANGE ACTIVITIES

Office of Energy Efficiency and Renewable Energy Programs

The Energy Efficiency and Renewable Energy (EERE) program supports the Department of Energy's strategic objectives of increasing the efficiency and productivity of energy use, while limiting environmental impacts; reducing the vulnerability of the U.S. economy to disruptions in energy supplies; ensuring that a competitive electricity generation industry is in place that can deliver adequate and affordable supplies with reduced environmental impact; supporting U.S. energy, environmental, and economic interests in global markets; and delivering leading-edge technologies that are critical to the nation. The FY 2000 budget request for these

programs is \$1.045 billion, an increase of \$184 million above FY 1999 appropriated levels.

The EERE strategic goals reflect the Administration's emphasis on Federal energy R&D for delivering significant benefits to the nation. In its 1997 review of the national energy R&D portfolio, the President's Committee of Advisors on Science and Technology recommended increases in a number of energy efficiency R&D programs. The Committee noted that energy efficiency technologies produce near-term and rapidly expanding public benefits, including air emissions reductions, reduced dependence on imported oil, and lower costs to households and firms. According to the Committee's analysis, R&D investments in energy efficiency have contributed to efficiency improvements that save U.S. consumers approximately \$170 billion per year. The Committee called for significant expansion of energy efficiency programs in order to meet the energy challenges and opportunities of the 21st century.

The long-term program goals are: to develop, by 2004, a prototype 80 mpg family car and, by 2002, a 35% more efficient light truck without compromising safety, comfort, performance or cost; by 2010, improve and reduce energy use per unit output of the most energy-intensive industries by 25%; by 2010, improve the energy efficiency of new homes by 50%, new commercial buildings by 30-50%, and existing buildings by 20%; triple U.S. non-hydroelectric renewable energy capacity by 2010; and by 2005, cut Federal energy use by 30% from 1985 levels and stimulate markets for energy efficiency and renewable energy technologies.

The following table presents the estimated benefits of the Energy Efficiency and Renewable Energy Programs R, D, D&D in terms of energy displaced, energy cost savings and reductions in carbon emissions at the proposed FY 2000 budget level. Estimates are derived through the Quality Metrics Methodology and are independently peer reviewed.

The program benefit ranges are developed through an impact analysis process undertaken annually by the Office of Energy Efficiency and Renewable Energy (EERE). The upper point of each range is based on analysis conducted by EERE's sectors and externally reviewed by Arthur D. Little. The sectors analyze the impacts their programs will have on energy savings, cost savings, and carbon reductions if all program goals are met. The lower point of each range for energy displaced and carbon reductions is derived from an integrated analysis model run by external contractors that controls for interaction effects. The integrated analysis model accounts for inter- and intra-sector double-counting as well as market trends, including reductions in new electricity generation. The lower point of the energy cost savings range is calculated by multiplying the total primary energy displaced, derived from the integrated analysis, by the sector's energy cost savings/total primary energy displaced ratio for that year.

OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY—ENERGY EFFICIENCY PROGRAMS PROJECTED BENEFITS BY SECTOR THROUGH THE YEAR 2020

	Total primary energy displaced (Quadrillion BTUs)		Energy cost saving (\$ billions)		Carbon Reductions (million metric tons)	
	2010	2020	2010	2020	2010	2020
Transportation Sector (oil savings in quads)	1.0-1.2 (1.6-1.8)	1.7-3.0 (3.0-3.8)	7.8-9.9	12.1-22.1	17.0-24.8	26.5-59.8
Industry Sector	0.8-1.5	2.1-4.4	3.5-6.0	7.3-16.2	16.7-29.4	43.6-92.8
Building Technology, State & Community Sector	1.4-2.3	2.4-5.7	9.5-16.1	16.5-38.7	25.3-35.9	51.9-82.3
Federal Energy Management Program	0.1	0.1	0.4	0.4	1.2	1.2
Power Sector	0.7-1.2	1.4-2.6	0.8-1.4	3.0-5.7	14.9-23.2	33.2-45.3

Our programs have a compelling record of success. Most Federal research and development for the Partnership for a New Generation of Vehicles is supported by the EERE Office of Transportation Technologies, working with automobile manufacturers and their suppliers to develop an 80-mpg family sedan by 2004 at a cost, performance, safety and comfort level similar to today's models. In addition, the PNGV effort has led to significant engine and materials technologies being incorporated into current vehicle models. Also, we have built prototype diesel engines for small

trucks that could be twice as efficient as current sport/utility vehicle engines with very low emissions. Finally, our work has helped make possible large-scale deployment of alternative fuel vehicles—such as natural gas cars and buses.

The Industries of the Future program, implemented by the EERE Office of Industrial Technologies, allows the nation's most energy-intensive industries to share in the planning, research, and development of industrial technologies that reduce energy costs, resource waste, and the burdens of pollution, for a more productive and environmentally sound manufacturing base. For example, in the steel industry, we have developed and demonstrated a portfolio of technologies that likely will save over \$8 million per year at Bethlehem Steel's Burns Harbor, Indiana, plant and could save nearly \$200 million per year if implemented industry-wide. We have also developed a wide range of cross-cutting technologies that are being applied across many industries, for example, efficient motor and steam systems and advanced materials. Finally, we have nearly completed the development of our revolutionary high-efficiency, low-emissions natural gas turbine for industrial applications. These technologies cut production costs in the industries America needs to stay competitive—such as petroleum production, forest products, agriculture and mining.

The Office of Buildings Technology, State and Community Program's Building America Program supports the energy goals of the Partnership for Advancing Technology in Housing (PATH), a Presidential initiative that brings Federal agencies and industry together to accelerate the creation and widespread use of advanced technologies to radically improve the quality, affordability, disaster resistance, and environmental and energy efficiency of the nation's housing. In the Building America program, we have also demonstrated to builders from Pittsburgh to Los Angeles that they can build 50% more efficient houses without increasing their construction cost. Through the Rebuild America program we have partnered with communities across the nation to continue energy efficiency retrofits in 400 million square feet of commercial buildings that will save over \$140 million per year in energy costs. We have developed a revolutionary natural gas chiller that significantly increases building cooling efficiency. Finally, we have reinvented the appliance efficiency standards process to increase coordination—and the likelihood of consensus—with industry and other affected stakeholders.

In the federal sector, we have had remarkable success in reducing federal building energy costs saving taxpayers more than \$800 million per year as a result of efficiency and renewable energy projects. The EERE Federal Energy Management Program (FEMP) has developed contractual mechanisms to attract substantial private sector funds to improve the energy efficiency of Federal facilities. However, we are now at a critical juncture. To move the remaining distance to meeting our 30% federal energy efficiency goal, we have put into place large regional super Energy Savings Performance Contracts to bring private sector energy efficiency financing into the federal infrastructure. This strategy is proving successful, with more than 190 "delivery orders" under these contracts now in the works, with total potential value in the hundreds of millions of dollars. A recent single order from NASA facilities in Texas is valued at approximately \$43 million. However, we will not be able to effectively meet this great demand without adequate federal resources to manage this work across all federal agencies.

Our renewable energy programs have been equally successful. The Office of Power Technologies' Renewable Energy programs are designed to advance a broad range of renewable electric, fuel, and related storage and power delivery technologies to provide the nation with a more reliable, affordable and clean energy supply. Twenty years ago renewable energy was generally produced at a very high cost and in an inefficient manner. Advanced power delivery system components and high temperature superconducting materials did not even exist, and the alternative transportation fuel sector was very immature. We have come a long way.

For example, the cost of electric power from wind turbines in 1980 ranged from \$0.30—\$0.40 per kilowatt-hour (kWh). Through aggressive R&D by EERE and its industry partners on wind turbine aerodynamics, materials development and computer-aided design, we have been able to reduce the costs to between \$0.04 and \$0.06 per kWh. At this price, wind systems are entering the marketplace, expanding from the early California windfarms to include States ranging from Vermont to Alaska and from Minnesota to Texas.

As another example, the first commercially-available photovoltaic (PV) systems in the early 1980s produced power at a cost of more than \$1.00 per kWh. By FY 2000, PV systems will be delivering electricity for as low as \$0.12—\$0.20 per kWh—depending upon the specific technology—making clean, reliable PV systems competitive in many remote and on-grid sites here in the U.S. and around the globe. By 2010 we project PV-generated electricity will drop to \$0.10 per kWh. At this price solar would be a competitive power option in many urban and suburban areas

where transmission and distribution systems are constrained and also in rural areas across the entire United States where distribution costs are high.

Office of Fossil Energy

The Office of Fossil Energy has three major program elements which will contribute significantly to lower emission rates of greenhouse gases: more efficient power plants, carbon sequestration and enhanced natural gas production. The power systems program contributes by developing new power generating technologies for either coal or natural gas, which will be more efficient than existing technologies, and which thereby can produce power with about 40% less carbon emissions than conventional technologies using those fuels. This program will result in "power-plexes" which are modular in design and can use multiple feedstock materials (coal, gas, biomass, opportunity fuels like petroleum coke), to produce a slate of market relevant energy products, including electricity, steam, chemicals, and alternative fuels. One promising configuration, for example, would co-produce electricity and a fuel which could facilitate an extremely clean and high efficiency diesel engine for transportation.

The carbon sequestration program is targeted at both capture-and-control systems associated with advanced power cycles, as well as approaches which will enhance natural sinks for greenhouse gases. This program has the potential, after 2015, to eliminate hundreds of millions of tons of carbon-equivalent from the atmosphere.

Finally, the natural gas exploration and production program is developing technologies to reduce the cost of finding and producing natural gas, which is the fossil fuel with the least emission of CO₂ per unit of useful energy. The total FY 2000 budget request for higher efficiency power systems, carbon sequestration, cleaner fuels and related advanced research is \$202 million. The budget request for natural gas exploration and production, storage, processing and related environmental research is \$26 million. Within this overall budget which contributes to lower emissions of greenhouse gases, \$37 million has been designated as part of the President's Climate Change Technology Initiative (CCTI). The research which is included in CCTI includes those portions of the power systems program which will enable attainment of very high efficiencies, and research on carbon sequestration.

The program goals are to develop, by 2015, power systems to produce electricity from natural gas at more than 75% efficiency, and power systems to produce electricity from coal at more than 60% efficiency, while emitting near zero levels of conventional pollutants, and at a cost 10% below the cost of today's commercial technologies. These efficiency goals are approximately 50% higher than today's state-of-the-art technologies. More stringent efficiency goals are set for systems incorporating cogeneration of electricity and steam.

These technologies will be amenable to CO₂ sequestration. The long-term goal for sequestration is to develop technologies which have the capacity to offset all growth in U.S. greenhouse gas emissions after 2010, from all energy sectors, assuming a "business-as-usual" emission projection, beginning in the year 2015. The long-term cost goal for sequestration is \$10 per ton of carbon sequestered.

From a more technical perspective, the power system research will focus on new enabling technologies, such as low-cost oxygen and hydrogen separation membranes, high temperature heat exchangers, improved gasifiers, advanced gas cleanup systems, advanced combustion systems, hybrid electricity systems, advanced turbines, and systems which co-produce electricity and fuels or chemicals. Critical supporting technologies will also receive close attention, including advanced materials, catalysts, and sorbents; computer science to simulate complex systems without building them; and advanced controls and sensors.

Sequestration research will pursue technologies to capture and separate carbon dioxide from energy processes and combustion, disposal technologies for geological and marine alternatives, enhanced natural sinks for greenhouse gases, and advanced concepts to transform CO₂ into either useful or environmentally benign products.

PERFORMANCE GOALS

FE's R&D program has met past performance goals related to energy and environmental objectives set by the national energy plan. These include boosting the nation's production of natural gas by developing advanced technologies to drill wells and store natural gas, reducing pollutant emissions and carbon dioxide emissions from new fossil fuel fired power plants, and developing new concepts, such as use of methane hydrates, to help meet 21st century energy needs.

The benefits of both the base power systems R&D and the incremental CCTI funding for fossil energy are reported together in the table below. The research itself will require a little over a decade to be completed, and a period for market accept-

ance of the new technology will follow. As a result, benefits will not begin to accrue until 2015, but will be quite substantial by 2030. Benefits from sequestration R&D will follow a similar pattern. It should be noted that the benefits below are predicated on a successful R&D program, meaning that both performance and cost goals of the R&D are met.

REDUCTION IN CARBON EMISSIONS

[Million metric tonnes of carbon per year]

Type of benefit	2015	2030
Deployment of Coal and Gas Power Systems in the U.S.	5	75
Deployment of Coal and Gas Power Systems in Rest of World	10	105
Carbon Sequestration in Rest of World	0	260

In addition to the carbon reduction benefits identified above, these programs result in power systems which are nearly pollution free, so there will be additional significant benefits in reductions of traditional air pollutants such as particulate matter, sulfur dioxide, nitrogen oxides, and toxic air pollutants. It should also be noted that the co-production of liquid fuels with electricity at advanced power systems is projected to yield a fuel which is particularly well suited for ultra-high efficiency diesel engines and could be an enabling technology which facilitates substantial carbon reduction when used in tandem with those engines.

OFFICE OF SCIENCE

The FY 2000 budget request proposes \$20 million for the Office of Science, an increase of \$13 million over FY 1999 enacted, to enhance the underlying science base for the transportation, industry, and electricity sectors.

The carbon sequestration research program in the Office of Science will focus on the understanding necessary to exploit the biosphere's natural processes for use in sequestration of atmospheric carbon dioxide. This includes the roles of marine microorganisms in ocean carbon sequestration and the mechanisms by which forests and other ecosystems sequester carbon. The ultimate goal is to understand and develop appropriate ways to enhance the natural carbon cycle in both the terrestrial and the oceanic systems.

Research on carbon sequestration emphasizes ways to increase carbon sequestration by enhancing the natural capacity of the terrestrial biosphere and oceans to take up and store carbon. Terrestrial aspects of this research focuses on physiology and growth responses of terrestrial ecosystems, and the transformation of biomass into long-lived and stable pools of soil carbon. Fundamental research on soil, microbial, biological processes, including field experiments and manipulations, provides the basis for biotechnical modifications of carbon cycle processes. Oceanic studies will focus on enhancement of carbon dioxide uptake by means of fertilizing phytoplankton with micro- or macro-nutrients. Deep injection of carbon dioxide is also under investigation. The research products provide basic knowledge for manipulating and managing terrestrial environments and oceanic systems in ways that enhance the long-term sequestration and storage of carbon in "natural" components of the carbon cycle. Carbon sequestration research initially is being implemented in Centers for Innovative and Interdisciplinary Studies at National Laboratories.

Basic research in geological carbon sequestration will primarily emphasize developing the understanding needed for evaluating the potential of sequestration of carbon dioxide in deep reservoirs. The research program will focus on four areas: (1) understanding the mechanical stability of porous and fractured reservoirs/aquifers during injection and over the long times required for sequestration; (2) understanding the flow of fluids with multiple phases within the aquifers; (3) understanding the geochemical reactivity within and among fluids, and between fluids and rocks within the reservoirs/aquifers; and (4) improving high-resolution geophysical imaging which will be needed to track performance of sequestration reservoirs.

In other sequestration research, the DNA of microbes that could be used to sequester carbon dioxide will be sequenced. One such microbe to be sequenced constitutes up to half of all the photosynthetic biomass in the ocean. The terrestrial microbes selected for sequencing are major players in soil carbon cycling; one uses light to fix carbon (interestingly, it doesn't produce oxygen in that reaction) and the other uses energy from metabolic processes rather than from light. New research is being initiated to characterize key reaction pathways or regulatory networks in these microbes following the determination of their DNA sequence. Understanding

the enzymes and these pathways may help us tilt the natural equilibrium towards more and longer carbon storage in soils, potentially enriching the soils and the productivity of the plants that grow in them.

In order to understand the mechanical stability of formations, a better understanding of the stress-strain-poroelasticity-viscoelasticity-thermoelasticity constitutive relationships are necessary, as are fracture mechanics models. Fluid flow studies are needed to understand mixing, fingering and phase retardation, fluid-fluid transport at ambient and injection conditions, fluid-fluid-mineral interactions including wetting behavior, and surface tension effects. In order to understand the fluid and mineral evolution of potential storage formations, a better understanding of the geochemical reactivity of fluids within reservoirs/aquifers is needed under conditions involving fluids rich in constituents important for CO₂ sequestration. In order to monitor reservoir stability and to track injection progress and potential leakage, we need to develop improved high-resolution seismic and electromagnetic imaging techniques and inversion codes applicable at reservoir depths and scales.

The budget proposes \$12 million for DOE fundamental science in research to support the transportation, industry, and electricity sectors, an increase of \$7 million over FY 1999 enacted levels.

The research focus areas are those that promise the maximum impact in the area of carbon management and that build on strengths of current Office of Science programs. In the Materials Sciences subprogram, research focuses on three areas: high-temperature materials for more efficient combustion, magnetic materials that reduce energy loss during use, and semiconductor materials for solar-energy conversion. In the Chemical Sciences subprogram, research emphasizes atomic and molecular level understanding of chemical processes to enable predictive capability. A major component of the research will aim at reducing emissions of carbon dioxide through fundamental understanding of the chemistries associated with combustion, catalysis, photochemical energy conversion, electrical energy storage, electrochemical interfaces, and molecular specific separation from complex mixtures. Finally, in the Energy Biosciences subprogram, research emphasizes the biological process of photosynthesis, which is central to global carbon cycling.

The new research efforts supporting advances in low/no carbon energy technologies, as well as existing activities, will be closely coordinated with DOE's technology programs and will provide the knowledge base for the development of advanced technologies to reduce carbon dioxide emissions. Many of the activities will impact the Office of Energy Efficiency and Renewable Energy (EE) and the energy and transportation industry by providing options for increasing efficiency in automobiles by reducing weight, for increasing efficiency in the use of electricity by increasing the efficiency of electric motors and generators with better magnets; for increasing efficiency in the transmission of electricity by using superconductors; and for reducing energy consumption in manufacturing with improved sensors, controls, and processes. Much of this research program will provide the knowledge base needed to increase the use of renewable resources with research aimed at understanding the metabolism of carbon dioxide and the metabolic pathways to the production of methane and other biofuels.

OFFICE OF NUCLEAR ENERGY

The budget proposes \$5 million, an increase of \$5 million over FY 1999 enacted, for DOE's new Nuclear Energy Plant Optimization (NEPO) program. During the next 10-20 years, while efforts continue to reduce the costs of renewable energy alternatives, it will be important to renew licenses and continue to operate nuclear power plants beyond their initial license term in order to avoid pressures to build quick replacement capacity with fossil-fueled plants. R&D under NEPO will investigate materials degradation and how to prevent or repair it, improving nuclear plant capacity factors, and methods of retrofitting current technology into older reactors to improve their reliability and safety.

U.S. GLOBAL CHANGE RESEARCH PROGRAM

Areas of Global Change Research. Research by DOE's Office of Biological and Environmental Research addresses the effects of energy production and use on the global Earth system primarily through studies of climate response. It includes research in climate modeling, atmospheric chemistry and transport, atmospheric properties and processes affecting the Earth's radiant energy balance, sources and sinks of energy-related greenhouse gases (primarily CO₂), consequences of atmospheric and climatic changes on vegetation and ecosystems, critical data needs for global change research and for early detection of climatic change, support of scientifically based assessments of environmental and economic consequences of climate change,

and funding for education and training of scientists and researchers in global change.

FY 2000 Program Highlights. The DOE Biological and Environmental Research (BER) program utilizes the unique multi-disciplinary facilities of the DOE National Laboratories and supports research and infrastructure at these Laboratories, universities, and other research institutions. With the other USGCRP agencies, a new focus in FY 2000 is the Accelerated Climate Prediction Initiative (ACPI), which will integrate the frontiers of computational science and climate science to accelerate progress in climate simulation model development and application, to substantially reduce the uncertainties in decade-to-century model-based projections of climate change; and to increase the availability and utility of climate change projections to the broader climate change research and assessment communities. Additional new resources are requested by DOE for new research to advance understanding of the global carbon cycle, particularly how natural processes control the exchange of carbon between the atmosphere and terrestrial and marine ecosystems. In support of the USGCRP, the BER program includes activities in the following four key areas: Climate and Hydrology; Atmospheric Chemistry and Carbon Cycle; Ecological Processes; and Human Dimensions.

OTHER CLIMATE-RELATED PROGRAMS

Nuclear Energy Research Initiative. The budget proposes \$25 million, an increase of \$6 million over FY 1999 enacted, to fund collaborative partnerships among national laboratories, universities, and industry R&D organizations. Potential areas of research include proliferation-resistant reactors and fuel technologies, new techniques for on-site and surface storage of nuclear waste, and other advanced design applications.

Low Income Weatherization and State Energy Grants. The budget proposes \$191 million, an increase of \$25 million over FY 1999 enacted, for programs that facilitate energy efficiency investments at the State and local level. DOE's Weatherization Assistance Program provides energy conservation services, such as insulation, to low-income Americans, reducing energy costs for consumers, improving health and safety, and reducing carbon emissions. The State Energy Program provides grants that enable States to tailor energy efficiency programs to local needs and leverage non-Federal resources.

CONCLUSION

The report requested by the following statutes provided a detailed account of Departmental spending and performance goals for climate change programs and activities, both domestic and international, as included in the President's FY 2000 Budget. The report was delivered to the Congress on May 19, 1999. The report was provided as a portion of the responses to Section 573 of Public Law 105-277, Omnibus Consolidated and Emergency Supplemental Appropriations Act, 1999, Division A, Foreign Operations, Export Financing, and Related Programs Appropriations Act, 1999; and, Senate Report 105-251, Treasury and General Government Appropriations Act, 1999. The report is consistent with the goals embodied in Senate Report 105-227, Department of the Interior and Related Agencies Appropriations Act, 1999; and, Conference Report on the Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act, 1999, House Report 105-769.

Mr. Chairman, in the last six years, the Department of Energy has made great strides in strategic planning and performance-based management. While we continually strive to improve the system, the progress we have made enables me to state confidently that our proposed budget increases, if appropriated, will not only help us meet the challenges of Climate Change but also improve our energy security, reduce air pollution and save consumers and businesses money.

Thank you again, Mr. Chairman, for the opportunity to testify.

Senator NICKLES. Mr. Glauthier, thank you very much for your statement.

Next we will hear from David Gardiner, who is Assistant Administrator for Policy at EPA.

Mr. Gardiner.

STATEMENT OF DAVID M. GARDINER, ASSISTANT ADMINISTRATOR FOR POLICY, U.S. ENVIRONMENTAL PROTECTION AGENCY

Mr. GARDINER. Thank you, Mr. Chairman.

I am going to take a minute here to put up a couple of charts to help guide our discussion on this issue, because we do want to focus on results and we have a couple of charts that help us articulate that.

[Chart.]

If I could, I wanted to open by thanking you and Chairman McIntosh for having this hearing. I think it is an excellent opportunity to talk about the administration's program and we welcome the opportunity to talk in particular about EPA's climate change programs and the fiscal year 2000 budget.

The next 10 years will be a decade of opportunity to address the very real and serious problem of global climate change, to reduce other pollutants, and to strengthen our national economy.

[Chart.]

As this chart on my right indicates, 60 percent of U.S. greenhouse gas emissions in the year 2010 will be generated by manufacturing plants, equipment, and products that are not now in place, but will be purchased between now and then. So if we are concerned about air quality in the year 2010 and beyond, if we are concerned about economic growth, we can address those concerns today in the decisions we make to purchase new capital stock.

If America fails to make these investments, the Nation will miss out on a huge opportunity to improve our environmental and economic future over the next decade. The President has put forth a plan that seizes that opportunity both responsibly and effectively.

EPA's voluntary programs and our research and development efforts are important parts of the President's plan and of the Climate Change Technology Initiative. Our programs are achieving solid results, results that can be measured, results that are reducing energy use today, saving money, and cutting emissions of several different air pollutants in communities across the country.

If the proven results of current programs continue into the future as we expect and if they are funded at the President's request level for fiscal year 2000, we expect by the year 2010 that our programs will achieve an additional reduction of at least 354 million metric tons beyond those reductions expected at current funding levels, as well as reducing emissions of nitrogen oxides, a major contributor to smog, by 850,000 tons, and produce an additional \$35 billion in energy savings for American consumers.

In the short term, we estimate that in the year 2000 our voluntary programs will reduce greenhouse gases by 58 million metric tons of carbon equivalent, reduce nitrogen oxide by more than 152,000 tons, reduce energy consumption by more than 59 billion kilowatt hours, and provide up to \$8 billion in energy savings to U.S. consumers and businesses that use energy efficient products throughout the year.

Let me emphasize several points about EPA's programs that are part of the President's plan. First, each of our 7,000 partners in private business, nonprofit organizations, and State and local gov-

ernments has chosen to participate. These programs are completely voluntary.

Second, our partnership programs impose no regulatory costs on the private sector. On the contrary, they help our partners save money, thus making them more profitable and competitive.

Third, our programs provide no financial subsidies. Our partners become involved simply because our programs make economic and environmental sense.

Most important, the benefits of the private sector investments leveraged by EPA's partnership programs are immediate. When an investment is made today in energy efficient technology, energy use drops immediately, money is saved immediately, air pollutants, including greenhouse gases, are reduced immediately. All the savings resulting from new technology deployment continue to accrue for decades to come, resulting in enormous aggregate benefits.

I wanted to mention one particular example of a success of our program to give you a sense of what we are doing. In Chairman McIntosh's home State of Indiana, the Fayette County School District has upgraded the lighting in its buildings. They own approximately 2 million square feet of school buildings. By making these investments, they have saved \$87,000 in energy costs and reduced their carbon dioxide emissions by more than 1,000 tons each year.

I would note that there are many schools and universities that are participating in EPA's programs. Since 1995 EPA's programs have helped schools and universities save more than \$200 million, enough money to buy 4 million books or hire 4,000 new teachers.

Mr. Chairman, we not only are seeking a substantial increase in our funding for fiscal year 2000 because we believe our programs are successful and they achieve the kinds of results that you and the taxpayers are looking for, but also because they will put us on the path to achieving success in seizing that opportunity in the course of the next decade as we go forward into the 21st century. We are looking forward to working with you in trying to implement those programs.

Thank you.

[The prepared statement of Mr. Gardiner follows:]

PREPARED STATEMENT OF DAVID M. GARDINER, ASSISTANT ADMINISTRATOR FOR
POLICY, U.S. ENVIRONMENTAL PROTECTION AGENCY

Messrs. Chairmen and members of the subcommittees, I am David Gardiner, Assistant Administrator for the Office of Policy at the U.S. Environmental Protection Agency (EPA). I want to thank the Chairmen of the Subcommittees holding this joint hearing for inviting EPA to testify today on our climate change program and related FY 2000 budget request.

THE PRESIDENT'S CLIMATE CHANGE PLAN

Global climate change is a very real and very serious problem. The President has put forth a plan, articulated most fully in a speech in October 1997, to address this problem responsibly and effectively in both the domestic and international arenas. EPA's voluntary programs included as part of the Climate Change Technology Initiative (CCTI) are an important part of that plan. Our programs are achieving solid results, results that can be measured, results that today are reducing energy use, saving businesses and consumers money, and cutting emissions of several different air pollutants in communities across the country. Because EPA's programs have proven so successful, and because we see more opportunities to apply them fruitfully, the President is requesting increased funding for them in FY 2000.

In addition to these budget proposals, the Administration has recently submitted to Congress an electric utility industry restructuring bill that would lead to CO₂

emission reductions of 40-60 million metric tons of carbon equivalent per year, while reducing energy bills for consumers. Bipartisan legislative proposals have been developed that would encourage and give credit to American businesses for making early, voluntary reductions in pollutant emissions. As I will explain, there are three elements in the President's plan to address climate change—the CCTI programs, electric utility industry restructuring, and early credits. All require action and approval by Congress. We stand ready to work with Congress on these three elements so the American people can enjoy the economic and environmental benefits that will result.

The President's plan is premised on the fact that man-made emissions of carbon dioxide and other greenhouse gases are undoubtedly changing the composition of the earth's atmosphere, trapping more of the sun's radiation. Over the past century the average temperature on earth has increased between a half and one degree Fahrenheit. Sea levels have risen 4-10 inches. According to the Intergovernmental Panel on Climate Change (IPCC), which reflects the expertise of more than 2,000 scientists, "the balance of evidence suggests that there is a discernible human influence on global climate." The best available science suggests that over the next century a worsening greenhouse effect could impose high costs on natural habitat, certain species of wildlife, coastlands, estuaries, drinking water aquifers, and human health. According to the IPCC, global warming in the future will have "wide-ranging and mostly adverse impacts on human health, with significant loss of life."

In response to these risks, the President has proposed to proceed pragmatically in three stages. In the first stage, EPA and other agencies are taking actions that help reduce greenhouse gas emissions while providing direct and immediate benefits to the economy. Specifically, the EPA voluntary partnership programs I am testifying about today are included in this first stage.

During the second stage, programs implemented during stage one will be reviewed, evaluated, and—depending on their success—extended. A pilot emissions trading program will be put in place and tested.

The third stage of the President's plan envisions implementation of an emissions cap and trading system—based on the successful experience with the acid rain program—to harness the power of the marketplace to limit greenhouse gas emissions as flexibly and efficiently as possible, and at the lowest possible cost.

EPA'S CCTI PROGRAMS

The EPA programs for which we are requesting FY 2000 funding are part of the CCTI. The CCTI represents a balanced three-part approach to cost-effectively address climate change:

- R&D to develop promising technologies, demonstrate their capabilities, and lower their costs;
- Targeted tax credits to support the initial stages of accelerated deployment of innovative technologies; and
- Voluntary programs to accelerate market penetration in subsequent years.

Let me emphasize some important aspects of EPA's CCTI programs. First, they are completely voluntary; each of our 7,000 partners in private businesses, non-profit organizations, and state and local governments has chosen to participate. Second, our partnership programs impose no regulatory costs on the private sector; on the contrary, they help our partners save money, thus making them more profitable and competitive. Third, our programs provide no financial subsidies; our partners become involved simply because our programs make economic and environmental sense.

Furthermore, our programs foster earlier market penetration of cost-effective, environmentally-protective technologies by overcoming marketplace barriers. These barriers include the lack of accurate, reliable consumer information on the environmental and economic benefits of different products, and low incentives for private-sector research and development. EPA's technology deployment programs minimize or remove these barriers in the marketplace so that businesses, households, governments, and industries develop and deploy clean technologies much faster than they would in a business-as-usual environment.

Faster, more extensive use of these technologies generates an additional benefit for the United States economy, because the technologies typically are developed and sold by American companies. Rapidly increasing sales of new technologies create profits and jobs for Americans. Moreover, because these technologies usually reduce emissions of many air pollutants besides greenhouse gases, they help us achieve a number of our long-term health goals.

Perhaps the most important quality of these programs is that their benefits are immediate. When an investment is made today in energy-efficient technology, en-

ergy use drops immediately. Money is saved immediately. Air pollutants, including greenhouse gases, are reduced immediately. All the savings resulting from new technology deployment continue to accrue for decades to come, resulting in enormous aggregate benefits.

Let me offer one further insight. According to an EPA analysis, sixty percent of U.S. greenhouse gas emissions in the year 2010 will be generated by manufacturing plants, equipment, and products that are not now in place, but will be purchased between now and then. EPA's partnership programs can help the American people tangibly address their concerns about air quality and climate change in the investment and purchasing decisions they make today. In other words, if we are concerned about air quality in 2010 and beyond, we can address those concerns today in the decisions we make to purchase new capital stock. If American businesses and families fail to make these investments, the nation will miss out on a huge opportunity to improve our environmental and economic future over the next decade.

Clearly, EPA's CCTI programs have been successful. Through the hard work and innovative thinking of our corporate and community partners, we have consistently surpassed our annual programmatic goals for greenhouse gas emissions reductions. We have demonstrated beyond any doubt that these voluntary partnership programs are win-win situations for the American economy and the quality of our environment. EPA estimates that every federal dollar spent on these programs drives 20 dollars of private investment, which in turn saves more than 70 dollars in energy costs while reducing carbon dioxide emissions by more than two tons.

EXAMPLES OF EPA'S CCTI PROGRAMS

EPA's CCTI programs already funded by Congress are helping American businesses, communities, and consumers make better investment and purchasing decisions, and those decisions are already cost-effective, improving worker productivity, and cleaning up the air. Let me give you just a few examples:

- Schools nationwide that have joined EPA's ENERGY STAR Buildings and Green Lights programs have increased the quality of their classroom lighting while achieving large reductions in their energy bills. For example, the Fayette County School District in Indiana has upgraded the lighting in 850,000 square feet of space, saving \$87,000 in energy costs, and reducing CO₂ emissions by 3.5 million pounds a year. In the aggregate, since 1995 EPA's programs have helped schools and universities save more than \$200 million. Savings in 1998 alone could buy more than one million textbooks or pay the salaries of 1,000 teachers.
- Home builders have built more than 5,000 ENERGY STAR homes that use 30 percent less energy than conventional structures, saving each homeowner \$400 per year in energy costs.
- Hundreds of businesses, large and small, and state governments across the country are protecting the environment while saving money through their participation in CCTI programs. For example, the state of Ohio is saving almost a quarter of a million dollars a year and preventing 15.5 million pounds of CO₂ a year by upgrading energy efficiency in over 5 million square feet of building space.
- Just three weeks ago the international semiconductor industry set a global emissions target for perfluorocarbons (PFCs), a solvent used in semiconductor fabrication facilities. PFCs are among the most potent greenhouse gases, having several thousand times more global warming potential—pound for pound—than CO₂. The industry voluntarily agreed to reduce PFC emissions by 10 percent or more by 2010. Motorola has set an even more ambitious corporate goal: reducing PFC emissions by 50 percent below 1995 levels by the year 2010. These actions build upon the voluntary partnership EPA formed with the semiconductor industry in 1995.
- EPA's Energy Star TV and VCR Partnership is working to reduce the amount of power used while equipment is in a standby mode. Initiated just last year, this partnership is expected to cut energy bills nationwide by about \$3.9 billion over ten years, while reducing CO₂ emissions by almost nine million metric tons of carbon equivalent.

These are just a few examples of how thousands of American businesses, schools, governments, and families—and some international companies—are using EPA-sponsored technology deployment programs to cut energy use while making sizable reductions in a number of different pollutants. Anyone looking for a real-world measure of the programs' effectiveness should talk to the people that have installed these technologies. Ask them about the results. Ask them if their actions resulted in real economic savings and real environmental improvements. I think you'll find

that EPA-sponsored technologies—like the “sleep” function of today’s computers—have become the performance standard around the world, even in some developing countries.

We have equally high expectations for the Clean Air Partnership Fund, a new program for which we have requested funding in FY 2000. The Clean Air Partnership Fund will help states, tribes, and communities investigate and demonstrate new technologies and other strategies that would address multiple pollutants simultaneously, including smog, soot, toxic air pollutants, and greenhouse gases. It is expected that the Clean Air Partnership Fund would support the development of capitalization mechanisms that can leverage federal dollars and substantially increase the Fund’s impact. As is the case with other CCTI programs, the Clean Air Partnership Fund is voluntary, and it would help stimulate innovative technology.

EPA’S GOALS FOR CCTI PROGRAMS

EPA’s year 2000 goals for our CCTI programs, which will serve all major sectors of the American economy, are to:

- Reduce greenhouse gases by 58 million metric tons of carbon equivalent (213 million metric tons of carbon dioxide equivalent), about as much as is emitted by 15 percent of our motor vehicle fleet.
- Reduce nitrogen oxides (NO_x), particulate matter, and mercury through better energy efficiency, and reduce water pollution through better fertilizer management. NO_x emissions alone will be reduced by more than 152,000 tons in 2000.
- Reduce U.S. energy consumption by more than 59 billion kilowatt hours.
- Provide up to \$8 billion in energy savings to U.S. consumers and businesses that use energy efficient products throughout the year.

These programs are working. But we think we can do even more, which is why the Administration is requesting a \$107 million increase over this year’s funding for EPA’s CCTI programs. We want to target other cost-effective, environmental-protecting opportunities. If the proven results of current programs continue into the future, as we expect, by 2010 this new funding would result in:

- An additional reduction of at least 354 million metric tons of carbon equivalent (1.3 billion metric tons of carbon dioxide equivalent), in addition to 850,000 tons of NO_x reductions; and
- An additional \$35 billion in energy savings for American families and businesses.

What’s more, we expect overall program effectiveness to improve as EPA’s programs mature and more energy-efficient technologies become available. As the head of the Energy Information Administration testified before Congress last month, the early market penetration of energy-efficient technologies, the kind of early penetration accelerated by EPA’s CCTI programs, may reduce future costs “through learning, establishing the infrastructure, and increasing familiarity with new technologies.”

EPA’s CCTI programs deserve to be expanded because they work very well. We’d like to carry our past successes into the 21st century, and with the support of the joint subcommittees and the rest of the Congress, we will.

THE KYOTO PROTOCOL

Let me reiterate the Administration’s commitment not to implement the Kyoto Protocol unless it is ratified by the U.S. Senate, and nothing in our budget request attempts to do so. As I said at the outset of this testimony, the President’s policy to address climate change involves international as well as domestic action. Climate change is a global problem that requires a global solution. The United States is an important contributor to the problem of climate change, but Americans did not cause the problem all by themselves, and they cannot solve the problem all by themselves. Consequently, we have sought to develop an international framework for appropriate action by all nations that contribute to the problem. The Kyoto Protocol, adopted in December 1997, was a monumental achievement towards that objective. The Protocol establishes emission reduction targets for more of the world’s most developed economies. It covers all the important greenhouse gases and gives credit for enhancing forests and other carbon sinks. It establishes a highly flexible, market-based structure in which to meet these targets, including five-year budgets to deal with normal economic cycles and other factors. It creates new international market mechanisms such as emissions trading and the clean development mechanism, to reduce costs by allowing emission reductions to be taken where they are least expensive.

To be sure, the Protocol remains a work in progress. Under the President’s direction, the Administration continues to work to spell out the important operating

rules for emissions trading and other provisions of the Protocol. And we continue to work to obtain meaningful participation by key developing countries, whose emissions are growing and who must be part of an effective global solution. Important progress was made towards both of these goals last fall in Buenos Aires, where several developing countries agreed to participate more fully in the Protocol, and where the Parties agreed to elaborate the operational rules I have referred to over the next two years. Clearly, the Protocol cannot enter into force for the United States unless and until ratified by the Senate, and we are committed not to attempt to implement the Protocol unless and until ratification takes place.

This concludes my prepared statement. I would be happy to answer any questions that you may have.

Senator NICKLES. Mr. Gardiner, thank you. To all of our panelists, I very much appreciate your statements.

The House Members obviously have a roll call vote. They will return shortly. We will go ahead and proceed and then allow them to ask questions when they arrive.

Let me just try to get a little bit better frame for the budgetary side of this. The budget request by the administration—Mr. Glauthier, I will ask you, but if this is more appropriate for Ms. Lee, maybe you can help me. The administration's request for last year was what, \$6.3 billion, is that correct?

Ms. LEE. I believe there is some confusion on the \$6.3 billion. That is a 5-year summary for the increase in the CCTI initiative versus the administration's request last year for 1999 was \$3.4 billion for the total of those four programs.

Senator NICKLES. Help me out a little bit more. I do not think that is—I want to make sure we are on the same page.

Mr. GLAUCHIER. If the \$6.3 billion is the figure that Ms. Lee was referring to, it is a combination of tax incentives and spending proposals over 5 years. The spending proposals, if I recall, were about \$2.7 billion over 5 years and the tax incentives would be about \$3.6 billion over that same period.

Senator NICKLES. Thank you.

I am looking at a chart that says the estimate for all of 1999 is \$3.4 billion. Is that correct?

Ms. LEE. Correct.

Senator NICKLES. And the proposed for 2000 is \$4.449 billion, almost \$4.5 billion.

Ms. LEE. Correct.

Senator NICKLES. That is correct. So that is a \$1.03 billion increase, is that correct?

Ms. LEE. Yes.

Senator NICKLES. And if you are talking about an annual of \$4.4 billion or \$4.5 billion, a 5-year cost of that would be \$22, \$23 billion, is that correct?

Ms. LEE. Yes.

Senator NICKLES. So the 5-year cost is not \$6 billion. The 5-year cost if the administration was successful, and I pray that you will not be, but if you were you would be talking about \$22, \$23 billion over the next 5 years; am I correct?

Ms. LEE. For this set of programs, yes.

Senator NICKLES. That is correct. I think many times there has been a numbers game. People say, well, how much is this going to cost? The chairman of the Budget Committee and I and others are working, we are trying to figure out—we have a law that says we are going to spend \$571 billion.

Senator DOMENICI. Total.

Senator NICKLES. Total for everything, you name it, all discretionary programs, \$571 billion for the year 2000. Now, you are asking for an extra billion dollars for these programs, is that correct?

Ms. LEE. That is correct.

Senator NICKLES. From one year to another. That is an increase of about 30-some percent, is that correct?

Ms. LEE. That is correct.

Senator NICKLES. You stated, Ms. Lee, in your comment, I believe, that you wanted to—that you have exerted fiscal discipline. But yet you are asking for a 30-some percent increase for these programs. When we have the total budget will be—it depends whether you count supplementals or not and we are having a current debate on that. But basically there is not going to be a growth in discretionary spending to speak of.

But yet you are asking for a 33 percent growth. Do you think that is realistic?

Ms. LEE. Sir, that is the President's budget submission and, as you all know, there is still a lot of discussion to go on that.

Senator NICKLES. I can tell you, there is no way.

You have to justify the money that you are now receiving. Fiscal year 1999 you did receive \$3.4 billion, is that correct?

Ms. LEE. That is correct.

Senator NICKLES. This is the first time I believe that this report has been put together, the detailed accounting of Federal climate change expenditures; is that correct?

Ms. LEE. My understanding is this is the second year; the first year with this kind of detail with the performance plans on it.

Senator NICKLES. Well, one, I want to compliment—and maybe our friends from the House are gone now, but I think it is important that we have this accounting, because before this thing was scattered throughout the budget and it was hard for some of us to figure out how much it cost. And interesting, because we are doing this somewhat in context with Kyoto, but a lot of us are concerned about the Kyoto Treaty. It has not been ratified and yet we see the administration running full speed ahead to see if we cannot—if they cannot, the administration cannot, appropriate a lot of money for a multitude of programs scattered throughout the budget.

How many programs altogether? Seventy, did I hear you say?

Ms. LEE. I think there were 32 programs outlined in this package.

Senator NICKLES. Thirty-two programs outlined in this package. Is this package complete?

Ms. LEE. Yes, sir.

Senator NICKLES. Are there other programs in addition to this that we are not counting?

Ms. LEE. No, sir.

Senator NICKLES. So for these 32 programs, total cost in fiscal year 1999 budget of \$3.4 billion, that you propose for next year a total of the 32 at \$4.5 billion; that is correct?

Ms. LEE. That is correct.

Senator NICKLES. I just wanted to get some kind of idea to make sure that we are on the same script. You intend—correct me if I am wrong—for this to be a continuing—could you give us the fig-

ures that you are proposing for the year 2001, 2002, 2003, for the next 5 years?

Ms. LEE. Senator Nickles, I do not have those specific figures. I do not have the total number for these 32 programs for you for 2001, 2002, et cetera. Those will be in the development budget process for those specific years.

Senator NICKLES. I would appreciate it if you could get these. I would also appreciate it if these reports could be submitted on time. Some of this—I believe this report we received April 20.

Ms. LEE. That is correct.

Senator NICKLES. I think the law was stating that we would like to have it when the President submits his budget, which would be February 1, so we can have a better analysis of it. Particularly if you are looking at submitting requests of increases of 30-some odd percent, you have to do a couple things. One, you have to justify whether these programs are having success, and what is the growth rate and the justification for the growth rate.

Mr. Gardiner, you mentioned that these have been fantastically successful. Well, let us move back a little bit. You spent \$3.4 billion or are in the process of spending. You are halfway through, a little over halfway through spending on 1999. In 1998, you spent a little over \$3 billion, is that correct?

Ms. LEE. Yes, \$3.1 billion.

Senator NICKLES. And in 1997 that figure was what? Do you have that in front of you?

Ms. LEE. I do not have that one in front of me. I can get it for you.

Senator NICKLES. Do you have staff close by? It was much less than \$3 billion, was it not?

Ms. LEE. I am sorry, sir, I do not know.

Senator NICKLES. If you would, Ms. Lee, just for our information, if you could give us the inception, from if that is 1992 or 1993 or whenever it is, that would help me in this growth that I am trying to figure out. This is the first time we have been able to look at all the programs together. I would like to see how much it is and see what kind of results we are getting.

Ms. LEE. They have not always been grouped this way.

Senator NICKLES. I understand.

Ms. LEE. So we will do some research for you.

Senator NICKLES. I would be most appreciative of that.

Senator Domenici.

**STATEMENT OF HON. PETE V. DOMENICI, U.S. SENATOR
FROM NEW MEXICO**

Senator DOMENICI. Senator, I have to be somewhere at 4. I did not get a chance to give any opening remarks. Do you think I could have a couple questions?

Senator NICKLES. I would defer to you, Mr. Chairman, any time.

Senator DOMENICI. Thank you, thank you.

Senator NICKLES. Senator Craig?

Senator CRAIG. No problem. Pass on, absolutely.

Senator DOMENICI. Thank you.

Let me just make an observation. Some of you have talked about the President having a program that makes us less dependent

upon foreign oil and you talk about it here. My recollection is when the President took office we were about 48 percent, 47 percent dependent upon foreign oil. We are now 57 percent, moving toward 58, and it is expected that we will hit 65 before anybody is able to wink.

Now, frankly, I hope the other programs are more successful than that one in terms of helping us with our dependence, because if they are any more helpful than they have been we would be totally, totally dependent.

Now, having said that, I would just like to know who puts together—where do you get your information to establish research projects that might help America with ambient air, the greenhouse, plus dependence on foreign oil? Who suggests these to you? Perhaps Mr. Glauthier?

Mr. GLAUTHIER. Sure. Some of the programs are programs that you are familiar with in the renewable energy area, for example, that are funded by the budget you preside over. Those are existing programs where we are trying to work with the people who can help us project what the needs are to continue the advances in the technology, the pilot projects to demonstrate some of those, and whatever assistance we may need in stimulating deployment.

As we do that, I am sure there are estimates of clean air benefits or other benefits that are estimated along with that.

Senator DOMENICI. Well, let me just give you a couple of thoughts and ask you where the sense to this, where did the sense come from. First, would somebody tell me, of our total electrical use how much of that comes from solar and renewables at this point in our history? Any of you know?

Mr. GLAUTHIER. I believe it is about 2.7 percent.

Senator DOMENICI. 2.7, sounds right.

Mr. GLAUTHIER. I am sorry. Plus the hydro portion as well, which is about 10 percent of hydro.

Senator DOMENICI. OK. But if you take hydro out—

Senator CRAIG. Mr. Chairman, though, it is important to note that they do not list hydro as a renewable.

Senator DOMENICI. No.

Mr. GLAUTHIER. For purposes of the incentives, the tax incentives—

Senator CRAIG. For political purposes, you do not. In your electricity and restructuring statement you do not list it.

Senator DOMENICI. Well, let me stay with where we are. I think the answer you gave me is the one I am looking for. It has nothing to do with hydro. Hydro was here long before any of you all. You are somewhat opposed to it rather than being those who develop it. So in any event, let me move ahead.

Now, how much does nuclear power contribute to the electricity use of Americans today?

Mr. GLAUTHIER. Eighteen percent.

Senator DOMENICI. Twenty-one percent, OK. But anyway, let us move along.

Let me ask you. Who would suggest that we spend \$400 million on renewable and \$5 million on nuclear, with that ratio of need in America, with the plants we have got needing some special attention because they need licenses renewed? Who hates nuclear so

much that they do not want to spend any on it? Where does it come from? Is there a place in this administration that thinks this is poisonous to America or what?

Mr. GLAUCHIER. Well, we are hoping that we can get that particular initiative approved this year. We proposed it last year and it was not approved by the Congress.

Senator DOMENICI. We did. They did not over in the House. But that is \$5 million. Yes, \$5 million, not a research program for improving the efficiency of nuclear powerplants. All the countries around the world are doing that and we are doing nothing.

It just seems to me that to sit here and talk about trying to help with the ambient air and greenhouse gases and not hear a word from any of you about nuclear power except a fleeting comment—I take that back—that you have some money in the budget seems to me to be just ignoring reality. I mean, is it real that America is going to get along with no nuclear powerplants and let the 21 percent or 20 percent disappear, and that we are going to take care of that with renewables?

Mr. GLAUCHIER. Well, we actually would like to thank you for the support last year in the nuclear area for the new program, which was the initiative to try to work on advances in the current facilities. We just awarded 45 new projects on the basis of over 300 proposals that we got for that funding, that \$19 million last year.

So we are hoping to move ahead and do more and deal with it.

Senator DOMENICI. Does the environmental protection policy have an anti-nuclear policy over there, anything but nuclear power?

Mr. GARDINER. We do not, Senator Domenici.

Senator DOMENICI. That is good. So are you in favor of it yourself?

Mr. GARDINER. I think the agency and the administration supports it. As you know, the primary programs for nuclear energy are located in the Department of Energy, so it is not a part of our budget request. But we think it is appropriate to keep it at the Department of Energy.

Senator DOMENICI. Well, frankly, the reason I raise this, and I will leave and go to my next meeting and stop being a nuisance, is that it really does not make a lot of sense to me to have people come up and talk about meeting the goals of the Kyoto agreement and whether you are implementing a policy to do that or not and have nobody emphasize nuclear power in the United States and in the future. It just does not make sense.

I showed the Kyoto report which your administration, our administration, this President, was part of drafting. I showed it to five great scientists, two of whom were Nobel laureates. And I said: Have you looked at this? Yes. What strikes you strange about it? Strangest thing about it, they said, is nuclear power is not even mentioned in a conference where we are talking about getting rid of greenhouse gases and one of the best ways to do it and most efficient is nuclear power.

So I just give you that, because whether we can fund some or all of the renewable requests I do not know, but I believe in terms of our future, these programs are really very, very much less relevant than the issue of where does America stand on nuclear power.

Thank you, Mr. Chairman.

Representative MCINTOSH [presiding]. Thank you, Senator Domenici. And by no means are you being a pest, because by my calculation for about one-tenth of 1 percent of the budget for CCTI you get almost a quarter of the savings in carbon. So I think you focused on exactly the right area where we can spend that money.

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

Representative MCINTOSH. Thank you.

Senator DOMENICI. Thank you all very much.

Representative MCINTOSH. Let me turn now to my colleague Mr. Kucinich for any questions that he might have.

Representative KUCINICH. Thank you very much, Mr. McIntosh. I have appreciated the opportunity to work with you on this issue through many hearings on the House side and I am glad to be here with Members of the Senate.

I have a couple questions. I would like to start with the GAO, Mr. Guerrero. Did you uncover any instances in which the EPA violated the Knollenberg rider in the VA–HUD appropriations bill?

Mr. GUERRERO. No.

Representative KUCINICH. Did OMB's climate change report provide the information required by law?

Mr. GUERRERO. It appeared to be responsive, but not as helpful as it could have been, as I described in my statement.

Representative KUCINICH. Did it follow the law?

Mr. GUERRERO. Substantially, yes.

Representative KUCINICH. Thank you. Mrs. Lee, the GAO criticized the report because it did not include performance goals that are specifically attached to each request for each requested increase in funding. Can you explain why this information was not always provided? For example, can you estimate how much useful technology would be attributable to each requested increase in research funding?

Ms. LEE. Mr. Kucinich, as Acting Deputy Director for Management, I very much look forward to working on GPRA issues and, as you know, GPRA and these performance measures are evolving. We started very clearly with each agency's individual performance results. Now we are beginning to look cross-cutting and this is one of those first actions of cross-cutting.

Representative KUCINICH. So it was not provided. Why?

Ms. LEE. Because we are still working on it. It is still a work in progress.

Representative KUCINICH. So this is still a work in progress?

Ms. LEE. Yes.

Representative KUCINICH. OK.

Mr. Glauthier, what are your concerns regarding language that may expand on the Knollenberg language?

Mr. GLAUTHIER. I think that we have existing programs that are ongoing, that are valuable, and as long as the language is restricted to steps that are solely taken to deal with climate change I think we are all right. But we would not want to see anything that was so broad that it impacted current programs, ongoing programs that have been established and going on for years dealing with the fundamental needs for energy efficiency and the like.

Representative KUCINICH. I would like Mr. Gardiner to respond to the same question.

Mr. GARDINER. Congressman Kucinich, a couple of points. One, I think that the administration has said repeatedly that we have no intention whatsoever to implement the Kyoto Protocol until it is ratified. I think that our primary concern in working with Congressman Knollenberg and others last year on the language was to make sure that the appropriations language did not in any way undermine our existing authority under other environmental statutes to protect public health and the environment, and we continue to have that concern.

Additionally, there is some language which has been proposed in another authorizing bill in a committee in the House that might restrict our ability to promote the diffusion of the technologies that we are promoting through our climate change programs, the technologies that are basically available today, that can reduce people's emissions today, can save people money today. Obviously, we would be quite concerned about any language that might restrict our ability to try to help the American public in that respect.

Representative KUCINICH. I have to say that I would associate myself with the concerns expressed by Senator Craig earlier about backdoor implementation of Kyoto. Certainly as a Member of the Senate, I can understand it even more, because that is the Senate's responsibility, and I would not want to see the administration do that.

I want to ask a question now to Mr. Glauthier. There is a lot of discussion about the climate change budget, and how it fits into the fight against global warming. However, is it not true that, even if global warming were not a threat, these programs would still be needed and make sense?

Mr. GLAUTHIER. Yes, that is absolutely true, for the reasons I gave in my opening statement, the fact that these really are important to improve our overall energy use, our energy security, our competitiveness worldwide. We have to continue to keep our industries at the forefront of worldwide competitiveness and to be positioned for markets that are going to be emerging.

Representative KUCINICH. I think, though, that the Senate Members' point is well taken. They do not want backdoor implementation. But I think it is incumbent upon the administration to make it abundantly clear that these are goals that you need to pursue anyhow. They may facilitate some aspects of Kyoto, but certainly, given the presence of the Senate, they are not about to implement Kyoto in its broad import.

Mr. GLAUTHIER. Exactly right, and we have not included in the budget anything that would be solely for the purpose of implementing the Kyoto agreement.

Representative KUCINICH. So I want you to know that from this side of the aisle, as a Democrat, I would not want to see any backdoor implementation. That really defeats the whole idea. We need people to talk about these issues and work them out in order to have a consensus. That is important to be able to arrive at a global climate change treaty, which I happen to believe, even though I do not have a vote on it in the House, we ought to.

But I also think that it would inspire needless opposition in the Senate, if we do not make sure that the importance of the work that you are doing on energy efficiency is stated as being relevant in and of itself.

Mr. Chairman, how much more time do I have? Do I have time for a few more questions?

Representative MCINTOSH. We have been fairly lax with the clock. Go ahead if you have got a couple more questions. If not, we will move on to Senator Craig and come back to you.

Representative KUCINICH. I appreciate that.

I would like to go back to Mr. Guerrero. You stated that the report would have been more useful if it had established more quantifiable goals, more results-oriented goals. However, you also explained that such goals are not always appropriate. Are there instances where you believe a quantifiable goal or a results-oriented goal would have been clearly appropriate, yet was not provided?

Mr. GUERRERO. I would have to say we did not look at those programs in that great detail, but I could give you an answer yes on that.

Representative KUCINICH. OK. The record shows—

Representative MCINTOSH. Would the gentleman yield?

That is pretty outrageous, given the statement that you gave for your testimony, to say you did not look at detail, but yet you try to indict them for having 11, only 11 out of 78 with a results-oriented measure. He is asking you, did you find any that should have outcome measures in those other 67, and to say you did not look at them in detail really raises a question about what good is your report.

Mr. GUERRERO. Let me clarify that. There are, as I said in my statement, some 13 programs for which there is an increase in funding for which there are no goals. So, yes, there should be goals stated for those programs.

Now, I cannot tell you, for each specific program, what the right goal should be. That is something we would have expected the Department of Energy or EPA or one of the other agencies to have developed.

Representative MCINTOSH. Mr. Kucinich.

Representative KUCINICH. Chairman McIntosh, it is always a pleasure to work with you. Thank you.

Representative MCINTOSH. If you have no other questions, let me turn to Senator Craig, who has been waiting patiently and been a leader in this area.

Senator Craig.

Senator CRAIG. Thank you, Mr. Chairman.

Mr. Guerrero, Congressman Kucinich asked an interesting question a few moments ago and you gave very short, precise answers. So I am curious as it relates to certain activities that are going on here and how GAO has looked at them as to what they mean in the context of a variety of legislative initiatives to try to bring all of this thing into our view to understand.

EPA stated in its testimony that it is moving forward with planning a credit for early reduction program. Given that there is no congressional consent for such a program and the Knollenberg amendment restrictions, is it appropriate for the agency to expend

funds for a program that it admits would require a mandatory cap on greenhouse gas emissions?

Mr. GUERRERO. If I could, I would like my Associate General Counsel to respond to that because it involves a legal analysis on that particular point.

Senator CRAIG. Thank you.

Mr. GUERRERO. That is Mr. Fitzgerald.

Representative MCINTOSH. Thank you. We will recognize Mr. Fitzgerald.

Mr. FITZGERALD. Senator Craig, the exact language of the Knollenberg amendment as enacted prohibits the proposal or issuance of rules, regulations, decrees or orders for the purpose of implementation or in preparation for implementation of the Kyoto Protocol. The operative language there has to do with the regulatory process, so that activities in our view that are short of, say, the issuance of an advanced notice of proposed rulemaking would not fall within the proscription of the Knollenberg amendment as enacted.

Senator CRAIG. So are you saying they are voluntary by nature? Is it the art of the language or the action itself?

Mr. FITZGERALD. The proviso as enacted triggers with the proposal or issuance of rules or regulations. The prohibition is on the use of funds for that activity, and any associated activity in consequence of that trigger. Activities that are undertaken without that trigger having taken place would in our view not be proscribed by the Knollenberg amendment of the fiscal year 1999 EPA appropriation bill.

Senator CRAIG. I see, OK. Thank you.

Mr. Chairman, I will be back. I find out there is a vote on and I have got about 6 minutes left to get there.

Representative MCINTOSH. Thank you, Senator Craig.

Senator CRAIG. It has something to do with the expenditure of money, so I better go vote. Thank you and I will be back.

Representative MCINTOSH. Your vote will be much needed, I am sure. I have a series of questions and I will return the questioning to you when you return.

Let me follow up quickly and then move on to other subjects. But Mr. Fitzgerald, while you are here, Mr. Knollenberg testified earlier that his intent was broader than EPA's interpretation. As the written testimony states, the amendment prevents the agency from misusing its existing authority to implement or prepare for the implementation of the Kyoto Treaty in advance of its ratification by the Senate.

In the legal interpretation you applied, was there a middle ground that is authorized but somehow would violate the Knollenberg amendment because it would prepare for the implementation of the Kyoto Treaty? Or is anything that EPA is authorized to do under law not covered by the Knollenberg restriction, in which case what the amendment really said was do not do anything that you are not authorized to do under law?

Mr. FITZGERALD. Chairman McIntosh, if I could, let me spend a minute describing the legislative history of the Knollenberg amendment. As reported by the House Appropriations Committee on July 8 last year, it would have prohibited, and as finally passed by the

House, as you well recall, it would have prohibited the development, proposal, or issuance of rules or regulations in contemplation of implementation of the Kyoto Protocol.

As finally enacted after conference, the word “develop” was dropped out of the proviso and the word “contemplation” was changed to “preparation.” In addition, in the conference report it was made clear that the views of the conferees were that the only programs to be covered within the scope of the Knollenberg amendment were those that were solely based upon the Kyoto Protocol.

I heard Congressman Knollenberg talk about what his intention was and I am sure that that was his intention. But on July 23 of last summer when the bill was on the floor, in response to an amendment offered by Congressman Obey, Congressman Knollenberg did describe his amendment as not affecting existing programs.

Several days later, however, in a colloquy with you on the floor just prior to final passage he did say essentially the same thing he said earlier today. However, that colloquy was challenged by Congressman Waxman and Congressman Obey as not expressing the intention of the House of Representatives. For that reason we felt it was important to take a look at the conference report, especially in light of apparent difference of opinion within the House of Representatives about whether the effect of that provision extended to existing programs authorized under current law.

Representative MCINTOSH. Let me ask you this. This only lasts a year for the cycle of the appropriations bill. If Mr. Knollenberg wants to bring his amendment again, then to protect his intent, he would need to at least change the report language to reflect that although the amendment does not remove any requirement that Congress puts on the agency, where the agency has discretion, it should not use that discretion if it advances the implementation of the Kyoto Protocol. So should we spell out the intent more clearly in the accompanying language?

Mr. FITZGERALD. Well, certainly the intent, his intent, was very clear. I think it would be important to spell it out in the statutory provision itself and not just in the associated legislative history. We have thought about some options that we would be happy to discuss with this committee or the Senate committee or Congressman Knollenberg’s office if so desired.

Representative MCINTOSH. Great. Yes, I would ask you to send those in to both committees and all members for them to review.

Let me turn now to Mr. Glauthier—“Glau-thee-AIR”?

Mr. GLAUTHIER. “Glau-thee-ER,” yes.

Representative MCINTOSH. This is a subject that I had hoped would not need to arise today. But as you recall, when you were up for confirmation Senator Enzi put a hold on your nomination and asked that OMB submit the documents that my subcommittee requested last year since, in your former position as OMB’s program associate director over natural resources, you were one of the principal people to work on the budget requests for climate change police.

I know I have talked with you and you have expressed a desire that we obtain access to that information. I have to share with you that many of those documents that were under your control have

not reached us and I am very disappointed by that. In fact, we may need to take it to the next level and consider what other tools we have in Congress to force those documents to be sent over to us.

So, let me ask you publicly what you have expressed to me, I think adequately, in person: Do you see any problem with this committee having those documents?

Mr. GLAUTHIER. No, I think that you have appropriate jurisdiction and ought to be able to see the documents that have been used, subject of course to the normal concerns that the administration has about predecisional information. So I think, though, that in an oversight capacity you ought to see the material that was used and be able to go through it.

Representative MCINTOSH. We have made it clear that we need even predecisional documents. For example, your notes on Janet Yellen's testimony about the climate change and her estimates of costs, we have not seen that. There are hundreds of documents.

Let me ask Ms. Lee, since OMB has control of those documents—do you have copies or did Mr. Glauthier take them over to DOE with you?

Mr. GLAUTHIER. No, they are still at OMB.

Representative MCINTOSH. That is what I assumed, but I wanted to check.

Representative KUCINICH. Nice try.

Representative MCINTOSH. Let me ask you, Ms. Lee, when will we get those documents? Your General Counsel I think has custody of them and we have not received them. The request has been long outstanding, and in fact I understand they were promised to us when Mr. Glauthier was up for confirmation.

Ms. LEE. Mr. McIntosh, I have the latest two pieces of correspondence. I know there has been a long history on this. I have the latest two pieces of correspondence, January 4, 1999, and March 22, transmitting to the committee, what we think fulfills those data requests.

So I am not aware of an outstanding data request that we have regarding information for this committee.

Representative MCINTOSH. Let me reassure you—and this was communicated to Mr. Damus yesterday by staff—those letters in no way fulfill that request. There are, I am told, a stack of documents 3 inches thick that were relevant, they met the earlier request, they were in Mr. Glauthier's files and accumulated by Mr. Damus, and we will need those documents in order to have that request fulfilled.

Ms. LEE. So the request has been made to General Counsel?

Representative MCINTOSH. We have told him that in our view the earlier request has not been fulfilled and yes, we need them. I would have preferred to have them before this hearing so we would not have to take time today to ask for them again. But my question to you is will you go back and do everything in your power to see that that request is fulfilled?

Ms. LEE. Yes, I will ask him what the status is. My information is everything is in, so I need to verify that.

Representative MCINTOSH. Let me assure you it is not, and so we will need your help on that.

Representative KUCINICH. Will the gentleman yield?

Representative MCINTOSH. Yes, Mr. Kucinich.

Representative KUCINICH. I just want to say that, yes, to the extent that the chairman feels he needs information I would support his request.

Do we have those two sheets there? Have you seen those, that she was offering?

Representative MCINTOSH. Yes, we have received that. They were letters back to the committee.

Representative KUCINICH. OK. I just wanted to make that statement. Thank you.

Representative MCINTOSH. We needed to cover that. But now, Mr. Glauthier, let me ask you a substantive question. On many of the programs that are in the CCTI I have an analysis given by the Energy Information Administration. It estimates the cost to the Treasury or the taxpayer essentially the various tax credit programs the administration is proposing.

Have you seen that analysis, or do I need to make a copy available to you?

Mr. GLAUTHIER. I am not aware of the specific reference you have there.

Representative MCINTOSH. Let me make sure you get a copy so you can look at it.

It is interesting. These are the different tax expenditures per ton of carbon reduced. It assumes different discount rates, but if you do not even use a discount rate, the buildings and equipment tax credit costs about \$86 per ton, buildings shell costs \$168 per ton, solar buildings are \$33 per ton, industrial CHP is \$28 per ton, biomass utility is \$60 per ton, cofirings in the utilities \$19 per ton. That is the least expensive—in terms of lost revenues—on the list. Wind generation tax credit for utilities costs \$140 per ton.

The weighted average is about \$133 per ton. Now, I know this is not for all the proposed tax credits directly comparable to Kyoto. In fact, the analysis points out that it does not consider other costs such as the cost to the private sector in purchasing the energy efficient equipment or making the energy efficiency investment. But the analysis does tell us what the tax expenditure per ton is.

Now, as you are aware because, CEA Chair Janet Yellen estimated that if we implemented Kyoto flexibly the cost per ton for carbon reduction would be \$14 to \$23 per ton. None of these tax credits, except for utility cofiring, would be within that range. But none of the others seem to meet that test.

My question is, should the Yellen test, in the absence of other performance measures, be one that you all should use?

Mr. GLAUTHIER. Well, the analyses that we are looking at, the EIA analysis, was done using a number of different assumptions than what the Council for Economic Advisers used in their analysis, assumptions about the rates at which these technologies would be adopted by the economy, rates of growth of the economy, a number of other things. The EIA analysis also did not really analyze the administration's bill exactly—or proposals as it was as a package.

We have got in addition the international factor. Janet Yellen's testimony was based on an assessment of an overall program, what would it take to meet the targets that were in the Kyoto Protocol,

and a lot of that would be met in the most cost effective manner, which would be outside the borders of the United States. We would do those things within the United States that are cost effective and then take other opportunities as they are available.

Representative MCINTOSH. But the point here is that in terms of tax expenditures—how much subsidy you give through the tax system for using those different technologies—all the credits are more expensive than what Ms. Yellen said it would be to implement the Kyoto Protocol, with the exception of the credit for utility cofiring.

Mr. GLAUTHIER. Well, the EIA analysis presents that, but we have our differences with the EIA analysis, and we think that these investments over time are going to be effective in really stimulating and advancing the technologies that will be cost effective and competitive. In fact, our analysis is that many of these technologies will provide cost savings to consumers that will be significant.

Representative MCINTOSH. You say under your analysis the cost per ton is different over time. Could you submit those analyses to these committees?

Mr. GLAUTHIER. We would be happy to. We have a series of different analyses. I believe many of them are already in the possession of the committee. Some of them, for example, the last couple of years have been done by the various DOE labs, where they have looked at technologies in a very detailed fashion, building it up from the ground up. I would be happy, though, to provide any more documents of that type.

[The information referred to follows:]

The following documents have been received and retained in committee files.

1. Study by Arthur D. Little, entitled Potential Climate Change Benefits of DOE Energy Efficiency and Renewable Energy Programs, report to the National Renewable Energy Laboratory, April 1999.

2. Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions, prepared by National Laboratory Directors for the U.S. Department of Energy, April 22, 1998.

3. Technology Opportunities to Reduce U.S. Greenhouse Gas Emissions, prepared by National Laboratory Directors for the U.S. Department of Energy, April 22, 1998. Appendix B, Technology Pathways Characterization.

4. Scenarios of U.S. Carbon Reductions, Potential Impacts of Energy Technologies by 2010 and Beyond, prepared by the Interlaboratory Working Group on Energy-Efficient and Low-Carbon Technologies, September 1997.

5. Scenarios of U.S. Carbon Reductions, Potential Impacts of Energy Technologies by 2010 and Beyond, prepared by the Interlaboratory Working Group on Energy-Efficient and Low-Carbon Technologies, September 1997, Appendices.

6. Federal Energy Research and Development for the Challenges of the Twenty-First Century, Report of the Energy Research and Development Panel, The President's Committee of Advisors on Science and Technology, November 1997.

Representative MCINTOSH. But would you agree with me in principle that we should not tax subsidies for different technologies that are more expensive than Kyoto itself? I mean, that seems to add to the cost of the energy savings effort.

Mr. GLAUTHIER. If the Kyoto figures, if you are using that reference to be an average cost effectiveness, then there are clearly going to be some above the average and some below. What we need to do is look at a portfolio to be sure—

Representative MCINTOSH. Well, let me interrupt you, Mr. Glauthier, because I remember Ms. Yellen's testimony. She came before our subcommittee. It was not an average. She had a range, but the reason she got it so low is that she assumed a great deal

of trading, so that in the marketplace technologies that were more expensive than that would never be implemented. They would buy credits from other countries under her assumptions.

Now, many of us questioned the viability of her assumptions, but that was the testimony she gave. So does it make sense for us to spend taxpayer dollars on technology that is more expensive and that presumably under Ms. Yellen's model will never be implemented to help us meet the goals of Kyoto?

Mr. GLAUTHIER. If the only purpose for spending the money is to meet the Kyoto agreement targets to reduce carbon emissions, then your statement would be right. You would want to use a marginal cost cutoff. But there are a number of these other benefits that we have talked about. So we would want to look at it in a complete sense.

Mr. GARDINER. Congressman McIntosh, if I could say that when we look at the broad portfolio of activities that are incorporated in the President's plan I think we are talking about, for example, long-term research and development the government would invest in, and indeed that Congress has supported, that may pay off in a fairly longer time period.

It may take us 10 or 20 years to achieve results in the marketplace because technology development requires a commitment, and I think it is important that we look at the tax package in the same light. It is not a program, as Deputy Secretary Glauthier said, to comply with Kyoto. It is designed to stimulate technological development and it may mean, as it does with long-term research and development, that the costs are high.

Representative MCINTOSH. Surely you would agree with me that a voluntary program, in which you provide tax incentives and people adopt the technologies voluntarily, should not be more expensive than a mandatory program, which is presumably what would result from the Kyoto Treaty?

Mr. GARDINER. I think if it is a voluntary program then people have the choice to participate in it, and that is of course the purpose of the tax incentives, to give people the opportunity to participate if they want to.

Representative MCINTOSH. And you think it is good policy in this country to ask taxpayers to pay more for a voluntary program than it would cost to implement a mandatory program?

Mr. GARDINER. I do not think that is the way the programs are constructed. I think that the programs are constructed to try to provide incentives to get these technologies out into the marketplace and to give consumers the opportunity to get the benefits both of the tax credits as well as of the technologies.

Representative MCINTOSH. Yes, at a huge loss for the taxpayer.

Let me propose, by the way that we use Ms. Yellen's estimate, the cost of \$14 to \$23 per ton, as a test, a standard for evaluating if not the results, even at least part of the performance of these different programs that are being proposed here.

Let me ask, Mr. Gardiner, while I have got you here—and we talked about the Knollenberg amendment earlier. I fundamentally disagree with your letter, but what are the agency's plans regarding the regulation of CO₂?

Mr. GARDINER. At this point we have no plans to regulate carbon dioxide if what you mean by that is to regulate it as a pollutant under the Clean Air Act as a criteria air pollutant.

Representative MCINTOSH. So EPA no longer has the position that they are legally allowed to do that under the Clean Air Act?

Mr. GARDINER. No, that is not correct. As you know, as we have shared with you, our legal counsel's opinion is that indeed we have the authority to regulate it. What you asked me was did we intend to do so and my answer to that was no.

Representative MCINTOSH. Let me ask you this: Have you re-examined that legal opinion in light of the recent appellate court decision that EPA acted unconstitutionally in the PM ozone regulations?

Mr. GARDINER. We have not.

Representative MCINTOSH. I would recommend you do so.

Let me ask about the agency's plan for early action credit. What is contemplated by that as the agency puts that forward?

Mr. GARDINER. Well, as I think you are aware, Congressman, a number of proposals have been advanced on the Hill, legislative proposals to offer people who take action to reduce their greenhouse gas emissions some form of appropriate credit. The President has indicated his support for an approach that would offer appropriate credit for companies that are acting today to reduce their greenhouse gases, and we look forward to working with the Congress to develop those legislative proposals as the President suggested in the State of the Union Address.

Representative MCINTOSH. Let me ask you some basic questions to get an idea of what you think would be a good program. What would early be, an early credit for action?

Mr. GARDINER. Well, at this stage I do not think the administration or the agency has developed a particular position on that. We are looking forward to working with Congress as a variety of proposals presumably will be advanced.

Representative MCINTOSH. Would it be contemplated, do you think, that the "early" period might extend past the deadlines for Kyoto?

Mr. GARDINER. I have no idea at this stage.

Representative MCINTOSH. What type of credit is contemplated in that?

Mr. GARDINER. Well, I think that the term that the President used was that it should be appropriate. Obviously, we will want to work with Congress carefully in defining what that might mean.

Representative MCINTOSH. I think that is a good idea. I suspect that the President's view of "appropriate" is different from mine.

But seriously, is it a regulatory credit, that perhaps there would be relief from other regulatory requirements? Is it a monetary credit? What types of things are being thought about and talked about?

Mr. GARDINER. I think at this stage the administration has no particular view as to what that might mean. We again look forward to working with Congress to develop precisely what it does mean.

Representative MCINTOSH. So does EPA support Senator Chafee's proposal on an early action credit?

Mr. GARDINER. Neither EPA nor the administration has a position on Senator Chafee's bill.

Representative MCINTOSH. Thank you. I do have some more questions, but Congressman Kucinich has asked if we could go into a second round and therefore let him be able to ask some, and I am happy to do that.

Mr. Kucinich.

Representative KUCINICH. Thank you. Thank you very much, Chairman McIntosh.

Before I ask a couple questions, I would like to reshape the context of at least one part of this debate. It appears to me that studies on economic impacts of Kyoto are mixing causes and consequences. Let me explain how.

The claim is that the only way to cut emissions is to increase the cost of carbon emissions. Then the claim jumps to the conclusion that the decrease of CO₂ emissions will ruin the U.S. economy because the cost of energy will increase. I think it is more likely that improving energy efficiency and conservation will decrease our dependence on foreign oil, decrease the need for burning coal, and open new jobs in energy-related industries. The United States has a chance to become a trailblazer in smart ways of doing more with less energy.

Furthermore, from some of the work that we have done in other committees, Mr. Chairman, most of the job losses in America are due to globalization of markets and cheap labor costs in other parts of the world compared to labor costs in the United States. My concern is that if you can find a way to push energy efficiency, it may make it possible for companies to remain in the United States since the energy bill decreases and can absorb better the labor cost.

Mr. Glauthier, it occurs to me that business and the environment go hand in hand and that the Kyoto agreement provides an incentive for new business development and new job creation by energy-related business. Certainly you have had contact with American industry.

Does American industry want early credits?

Mr. GLAUTHIER. Yes, absolutely.

Representative KUCINICH. Why?

Mr. GLAUTHIER. Many of them are taking actions now and they would like to get credit eventually whenever some kind of a program is put in place.

Representative KUCINICH. And it is also true, then, that it makes sense even without Kyoto, makes sense economically, to promote energy efficiency and conservation?

Mr. GLAUTHIER. That is right.

Representative KUCINICH. OK. I would like to go to the Framework Convention on Climate Change, otherwise known as the Rio Treaty, which has been ratified by the Senate. It commits us to voluntary reductions of greenhouse gas emissions, including carbon dioxide. Therefore, are not concerns about carbon dioxide emissions related to commitments other than the Kyoto Protocol?

Mr. GLAUTHIER. Yes, sir.

Representative KUCINICH. Now, to the EPA. Is it or is it not true that the EPA must continue to work on reducing CO₂ emissions notwithstanding the Kyoto Protocol's existence?

Mr. GARDINER. In fact, Congressman, most of the programs that we have at EPA that are aimed at reducing greenhouse gases were

launched in the wake of the Rio Treaty when that was negotiated in the previous administration, and a number of our programs that were aimed at voluntary reductions of greenhouse gas emissions have been in place since that time and we have been expanding them because they are successful. But we are trying to meet the commitments of the Framework Convention on Climate Change as one of our key objectives.

Obviously, in addition to that we are hopeful of making reductions in other pollutants besides greenhouse gases, and that is one of the many benefits that we gain from the programs that are part of the President's proposal.

Representative KUCINICH. One of the things, Mr. Chairman, that impressed me when I had the chance to go to Buenos Aires representing the United States as part of a congressional delegation in the Conference of Parties was that some of the leading industries in the world were there looking for changes in laws that could help them move to the next generation of energy, alternative energy development.

One such company was British Petroleum, whose chairman, Sir John Brown, had taken the oil industry into a whole new era. They are beginning to redefine themselves as energy industries, and in the recent BP merger, they have emerged as one of the largest solar research and production companies in the world.

We have examples right now in corporate America and in corporate leadership around the world of opportunities to make some quantum leaps in cooperation between business and government. This will accelerate the development of new technologies, which will create new job opportunities and also certainly a salutary secondary effect, will reduce the amount of greenhouse gas emissions.

I think we are moving in that direction. I also think that Chairman McIntosh's questions and his probing on these issues is always well taken, because it is important that questions be asked and that the administration be forced to make its case on the economic impact of these rules and laws, whether they are connected to Kyoto or not.

He and I may have some differences about the conclusions, but I appreciate Chairman McIntosh's work. It is important to get this debate out front so that nobody moves forward with no questions asked. In the long run, the questions that he is asking are going to be beneficial to this country, and I thank him for asking them.

I thank you for giving me the chance to participate.

Representative MCINTOSH. Thank you, Mr. Kucinich, for those kind words. In fact, I think we make a pretty good team in asking questions of a lot of different people.

In fact, I thought I saw Senator Craig come back in, but let me follow up on one of Mr. Kucinich's questions to Mr. Glauthier. I asked Mr. Gardiner about the early action credit program and I understand the administration has not yet formed a position. But you said there were a lot of businesses that would like to see that type of program put into place. What do they contemplate as a credit under those circumstances? Is it a credit, relief from current regulatory programs, or is it a credit against some future baseline when you do regulate carbon?

What is contemplated in the nature of a credit under those programs that business seems to be in favor of?

Senator CRAIG. Mr. Chairman.

Representative MCINTOSH. Yes?

Senator CRAIG. I am going to interrupt you for just a moment to introduce all of you to a rather unique way of measuring climate change. I would like to introduce you to a young lady who is a part of a test in Greenland right now to determine the impacts of climate change in the Greenland habitat of falcons.

I would like to introduce you to a gyrfalcon. This is Pete Jenny with her, who is part of the Peregrine Fund.

What do we call this young lady?

Mr. JENNY. This is a gyrfalcon. She is 1 year old. She is actually the focus of our research in Greenland. As many of you know, falcons are extremely sensitive to changes in both the quantity of their environment. This may well be one of the better litmuses for study of Arctic change or climate change.

Twenty years ago, our work in Greenland demonstrated many gyrfalcons and very few peregrine falcons nesting there, and it is just the reverse. Nowadays there are very few gyrfalcons and far more peregrine falcons.

Senator CRAIG. We have been tremendously successful with the return of the peregrine and, although this young lady was raised in Boise, ID, she is now having to compete.

Representative MCINTOSH. Senator, if I might ask, and things are often not quite as they appear on the surface, but you are saying that some falcons have actually been benefited by whatever changes you are measuring in Greenland and some seem to be—to have an adverse reaction to it?

Mr. JENNY. We cannot go that far.

Senator CRAIG. Apparently, there is a shift.

Representative MCINTOSH. But it may impact different species differently. Some of them may benefit from it and some of them may not.

Mr. JENNY. Clearly.

Representative KUCINICH. Mr. Chairman, I just want to say that is a beautiful bird. I like that bird. We are going to make sure those birds and their species are protected. We have got to be concerned also about the canaries in the coal mines. Thank you.

Senator CRAIG. Excuse me for interrupting.

Representative MCINTOSH. No problem.

I put a question to Mr. Glauthier, but then I will recognize Senator Craig for further questions after he has a chance to answer that.

Mr. GLAUTHIER. It is tough to follow that. It raises this to a new height.

The question had to do with the kind of credit businesses are seeking for early action. I would have to let the businesses speak for themselves on the details of this, but the fact that so many of them have been asking that this be included is one of the reasons it has been a fundamental principle of the administration's proposals over the last couple of years that, whatever it is that finally gets agreed to, we feel a credit for early action needs to be an element of the program.

Representative MCINTOSH. So in your discussions with them have they given any examples of preferences?

Mr. GLAUTHIER. I think there are different views of different ways of dealing with it. Generally, my sense is that companies are looking for credit against whatever future target the future program would be. But I really think you need to speak to them.

Representative MCINTOSH. We all make calculations about behavior, but would you agree with me that a company that receives that type of credit today would be more in favor of ratifying Kyoto in the future?

Mr. GLAUTHIER. I am not sure, because some of them I think have an insurance mentality. They want to be sure that if it is done they are going to get credit for it. I am not sure they have moved all the way over the line, though.

Representative MCINTOSH. That is possible as well. The reason I say that is I think there is a great deal of mischief that can be done in an early action credit program versus some other ways that it could be implemented. If you give credits today in a voluntary program for a future mandatory requirement, that changes the calculation that people have in terms of the desirability of that future program. You have essentially bought off people to be in favor of regulation because they have already paid the dues and they want their competitors to be hit with the same requirements. I have seen that a lot in reviewing regulations.

But if you give credit in other ways that are useful today and irrevocable, say if you voluntarily reduce your carbon dioxide emissions you will get a relief from other regulatory requirements that your business is subject to today, then that does not have that same mischief-making property and yet it does encourage people to move toward meeting those goals of reducing carbon dioxide. If some day the country adopted that as a goal, then we would be further along the way.

So that is why I have been probing this and have not really heard a definitive answer of which way people are thinking about it when they talk about early action programs, and it will explain some of the reluctance I have in moving in that direction.

But Mr. Craig, let me turn to you for any questions you have of these panelists.

Senator CRAIG. Thank you, Mr. Chairman. I will try to be brief. The hour is getting late and we have one more panel.

Let me ask GAO again another question if I could. The administration has signed the Kyoto Protocol. That signals their intent to, I hope, eventually submit the protocol to the Senate for ratification. Based on what you have seen of the administration's climate change programs, do we have an overall blueprint as to how this country would meet its binding reduction targets? That is about a 30 percent, 31 percent reduction in our carbon emissions by the year 2012. Can you respond to that?

Mr. GUERRERO. Senator Craig, as you know, last year when we testified, we indicated that the President's plan did lack that kind of specificity and we have not yet seen goals established for how exactly these particular programs add up to achieving the particular level of reduction.

Senator CRAIG. So in other words, you could not necessarily advise Congress today with this collection of programs that are at some stage of implementation that they would be the program that could bring us to that level of reduction?

Mr. GUERRERO. There are a number of program elements where there are carbon reductions specified. But as a total, as a whole, we could not look at this particular document and say it gets us this far down the road, because there is, as I indicated, a mix of performance indicators, both activity level and outcome. It is not clear what you are getting for the whole package.

Senator CRAIG. Given your knowledge of the Government Performance and Results Act and your familiarity with all the administration's carbon change programs now, given all this information, do you believe Congress has the sufficient information to decide if we should fund these programs at the requested level?

Mr. GUERRERO. Ultimately the decision to fund specific programs is going to be a decision Congress will have to make. The point that we felt was important to make here today is the document provided by the administration does not quite provide all the information we think you should have to make the best informed decisions.

Senator CRAIG. Mr. Gardiner, let me ask a couple of questions of you before I conclude here. Is EPA collaborating with any multi-department or agency research programs related to research?

Mr. GARDINER. To research on a particular topic?

Senator CRAIG. On this, climate change.

Mr. GARDINER. Climate change. The Environmental Protection Agency is a part of the overall administration research program, the Global Change Research Program, and a portion of our request in the President's budget would go to fund those research activities.

Senator CRAIG. In this collaborative effort, are you dealing with DOE and USDA?

Mr. GARDINER. I am not sure the total number. There is a fairly large number of executive branch agencies that are included.

Senator CRAIG. Are you the leader or the consultant?

Mr. GARDINER. We are actually a relatively small player in the administration's research efforts on global climate change. Larger agencies that are included are NASA, NOAA, and many other Federal agencies.

Senator CRAIG. If you are a small player, then how does EPA set its priorities on climate science research?

Mr. GARDINER. We do that in close cooperation through the coordinating body established through the Office of Science and Technology Policy at the White House. There is an administration-wide effort to coordinate science policy on global change research as well as on a variety of other topics. So our work is done in coordination with that effort.

Senator CRAIG. Do you comment on the research priorities of other agencies? Are you asked to do that or do you do that?

Mr. GARDINER. I do not know. I would be happy to find out, certainly, the answer to that question and get you more clarification as to how we participate in that process.

Senator CRAIG. I think it would be valuable for the committee to have that for the record.

Mr. GARDINER. Certainly.

[The information referred to follows:]

Question. How does EPA set its priorities on climate science research? Does EPA comment on the research priorities of other agencies?

Answer. EPA's focus on assessing the potential consequences of global change (i.e., our priority for global change research) was determined to:

1. ensure responsiveness to the Global Change Research Act of 1990;
2. reflect EPA's role within the larger USGCRP;
3. reflect a commitment to the National Assessment Process (required under the Global Change Research Act of 1990) and to ensure that EPA's Program addresses stakeholder needs through public-private partnerships;
4. respond to research needs identified in the National Academy of Science's 1998 *Pathways* report; and
5. respond to comments received in FY98 to an external peer review panel.

EPA is part of the larger U.S. Global Change Research Program (USGCRP). As such, it is involved in the development of the USGCRP's FY 2000 implementation plan and the USGCRP's *Our Changing Planet* annual report to Congress. Through this process, EPA coordinates its activities with those of other federal activities. Opportunities to cooperate with other federal agencies are also identified.

It is important to note that EPA is in the process of developing its new Research Strategy for its Global Change Research Program. This Strategy will go through a rigorous, external peer review.

Question. Has EPA factored into its budgets and programs the 1998 recommendations of the National Research Council regarding science priorities?

Answer. Yes. EPA, along with the entire USGCRP, incorporated the recommendations of the National Research Council (NRC) into the development of its programs. This consideration is reflected in the FY 2000 USGCRP *Our Changing Planet* annual report to Congress and the USGCRP's FY 2000 Implementation Plan. (A draft of this report has already been delivered to Congress by the USGCRP.) It is also reflected in EPA's new Research Strategy for the Global Change Research Program, which is still being drafted and will soon go through a rigorous, external peer review.

One example of how EPA responded to the recommendations of the NRC is its new support for Human Dimensions research as part of its assessment program. The NRC identified a wide range of Human Dimensions research questions that should be considered by the USGCRP. EPA is coordinating with other federal agencies to address many of these questions. EPA is working with other federal agencies to ensure that efforts are not duplicated and that each agency focuses on specific human dimensions questions related to its own program and niche within the USGCRP.

Humans have many different impacts on natural systems, including changes in land use, industrial processes, agricultural and forest management practices, and emissions of air and water pollutants. Humans also respond to the effects of global change. Human dimensions research entails understanding how humans, who are an integral component of the Earth system, contribute and respond to global change. Research on the environmental effects of human activities is critical for understanding long-term global change. The NARC's report reaffirmed the need to articulate how the science of global change is important to people and society. The new assessment-oriented EPA Global Change Research Program incorporates considerations of "human dimensions" into both its assessment activities and its foundation research program. In the assessment program, this will occur in two ways: (1) through ongoing engagement of stakeholders to define the specific measures of change that are of interest; and (2) through coordination of findings from the social sciences with those from the physical and biological sciences to attain a policy-relevant perspective. In the foundation research program, the near-term priorities for human dimensions research that are relevant to EPA's Global Program include understanding how humans, who are an integral component of the Earth system, contribute and respond to global change.

Senator CRAIG. Continuing with the balance of the role you play and the clarity of that role—has EPA provided any expert staff to advise the Department of State, especially the Under Secretary for Economics, Business, and Agricultural Affairs, on science issues related to the climate issue?

Mr. GARDINER. I do not know, but would be happy to answer that question for the record.

[The information referred to follows:]

Question 25. Has EPA provided any expert staff to advise the Department of State, especially the Under Secretary for Economics, Business and Agricultural Affairs (Eizenstat) or the Under Secretary for Global Affairs (Loy) on science issues related to the climate issue? If so, who are these individuals?

Answer. EPA does not have staff experts on science issues related to the climate issue detailed to the Department of State.

Senator CRAIG. That is Eizenstat.

Mr. GARDINER. I understand, yes. We will get you the answer for the record.

Senator CRAIG. Today in listening to your testimony, David, a larger part of your testimony focuses on energy policy, EPA's programs that affect energy costs, cuts in energy use, upgrading energy efficiencies. It sounds like EPA—if I were sitting here listening to you or Mr. Glauthier, I would suggest that you were the one that was establishing energy policy instead of the Department of Energy.

Is that appropriate?

Mr. GARDINER. I do not think that is what we are doing. Certainly the energy sector and energy policy generally has a significant impact on the environment.

Senator CRAIG. No question about it.

Mr. GARDINER. And we need to work closely together, and I believe the Department of Energy and the Environmental Protection Agency work extremely closely together, particularly in this area of climate change. We have closely coordinated our activities. We have a memorandum of understanding with the Department of Energy to be sure that our activities are closely coordinated.

So I think we have a good cooperative working relationship with the Department, but they clearly are the leaders on energy policy.

Senator CRAIG. Mr. Chairman, just one addition for David to not react to, but maybe follow up on, if you would. When we had the Administrator of EPA before the Appropriation Subcommittee that Chairman Bond chairs, I asked Ms. Browner to respond to a substantial series of questions that I felt needed more detail than just the give and take of the day of that committee.

That was on April 29 and it is extensive and I appreciate the time it would take to do this, but it should not take several months. It ought to be able to be done in a couple of weeks. It has not been done yet. We have not received it.

I wish you would carry that back to your agency. I think it is extremely valuable to that committee making up its mind as to what that final appropriation will look like as it relates to the moneys we decide to appropriate for the programs that EPA would like to implement. It was a template that both the chairman and I put together for that purpose.

Mr. GARDINER. We will get it done quickly.

Senator CRAIG. Fine. Thank you.

Thank you, Mr. Chairman.

Representative MCINTOSH. Thank you, Senator Craig.

In that light, let me say two things. One, for the purpose of the House I ask unanimous consent that the record be kept open for 2 weeks, and I understand that is standard procedure in the Senate, for the questions today, and there may be some additional questions which we will get to you right away that would be helpful to us.

One in particular I want to ask Ms. Lee before we move on to the next panel. In light of GAO's report about your agency's report to us on the program performance measures, you know, there were 44 line items in the budget that did not have anything there, across 14 agencies—when will these measures, line by line or budget item, be available for Congress to consider in this year's appropriations process?

Ms. LEE. Mr. McIntosh, I think Mr. Kucinich said it well. It is a work in progress, and we will continue to work with the agencies on these individual performance elements. They are evolving. Some are very good, some still need a lot of work, and we will continue to work on those.

Representative MCINTOSH. But we are in the process of moving forward with the appropriations for those 14 agencies. Are you suggesting we ask the leadership to stop work on those?

Ms. LEE. No, sir.

Representative MCINTOSH. OK. In that case your answer is not good enough. I would like to set a timetable with you where we can have updated reports. You may not have everybody's, but at least maybe on an every other week basis if you could submit the latest you have got, so that we can have whatever information is available as we move into the summer and the appropriations cycle.

Ms. LEE. There is a great deal of information in the agency's budget information, so we can try and find a balance with that and work with your staff to see what additional information we can provide.

Representative MCINTOSH. Great. Can I get your commitment that in 2 weeks we will get an update and then we will see from there what we have to do in terms of further updates?

Ms. LEE. Yes. I would like to work with your staff to make sure we are giving you what you need and we do not just kind of try to randomly provide you data. I would like to work with them and make sure we are really meeting your needs.

Representative MCINTOSH. That would be excellent.

Thank you. Thank you all for participating.

Senator CRAIG. Mr. Chairman, as they are leaving. Mr. Gardiner, you had mentioned a memorandum of understanding between you, EPA, and DOE. Could we get a copy of that?

Mr. GARDINER. Absolutely.

[The information referred to follows:]

DEPARTMENT OF ENERGY—ENVIRONMENTAL PROTECTION AGENCY

MEMORANDUM OF COOPERATION

ENERGY EFFICIENT, ENVIRONMENTALLY BENEFICIAL BUILDINGS

Whereas, the buildings sector utilizes 1/3 of all U.S. energy, 2/3 of all the electricity generated, costs consumers, homeowners and businesses \$200 billion per year, and produces a significant amount of air pollution, global climate change gases and landfill waste.

Whereas, achieving the goal of significantly improving the energy efficiency of buildings, reducing their environmental effects, and aiding the economy is a daunting undertaking, is consistent with the missions of both agencies, and requires the most effective uses, talents, and capabilities of both agencies.

Therefore, to achieve these common ends, the agencies agree to pursue a broad effort with the following areas of collaboration, under a theme of maximum effectiveness and minimum bureaucratic burden.

SCOPE OF COOPERATIVE PROGRAM

The cooperative EPA and DOE program consists of all agency efforts to accelerate market acceptance of highly efficient building technologies through voluntary public/private partnerships. The program consists of independent agency efforts which have been underway for several years as well as the enhancement of efforts under this agreement to transform the market.

COMMERCIAL BUILDINGS

EPA will recruit individual building owners, public and private, into the ENERGY STAR Building program, and provide a wide range of support, marketing, and training to implement the upgrading of existing commercial buildings.

DOE, through its Rebuild America Program, will support the creation of large-scale consortia, including cities, states, and counties, to encourage community-wide retrofit programs.

EPA will assist its partners to join or form Rebuild America partnerships and DOE will assist its partners to become ENERGY STAR Building partners.

RESIDENTIAL BUILDINGS

DOE will continue to support the development and adoption of Home Energy Rating Systems and the National Voluntary Rating Guidelines and will promote the marketing of efficient residential buildings through programs with national organizations such as the Home Energy Rating Systems Council (and its constituent members) such as EEL, AGA, NAHB, National Board of Realtors, EEBA, AARP, states and energy rating organizations and other stakeholders.

EPA will market energy efficiency for new residential construction through ENERGY STAR Homes programs encouraging projects with individual builders, developers, realtors, mortgage lenders, utilities, rating organizations and other stakeholders. The ENERGY STAR level for promotion will match the "5-star" level in the National Voluntary Rating Guidelines.

Both agencies will jointly enhance the program to improve the promotion of energy efficiency in the upgrading, remodeling, and rebuilding of existing residential homes.

EQUIPMENT AND APPLIANCES

Each agency will take the lead for the labeling of different groups of energy efficient products for residential and commercial buildings:

EPA will be primarily responsible for business and consumer electronic products (such as computers, facsimile machines, TVs and VCRs) and for products sold generally through contractor and manufacturer channels (such as heating, ventilating and cooling equipment), and insulation products.

DOE will be primarily responsible for appliances and similar products sold primarily through retail and consumer channels (such as home appliances, room air-conditioners, and domestic water heaters) and windows.

Each agency will develop ENERGY STAR efficiency levels appropriate for its respective programs and products using the same general criteria and with mutual consultation. DOE and EPA will coordinate their mass marketing activities and continue to identify and pursue additional labeling opportunities.

DOE will continue to work with the FTC to improve the current mandatory labels regarding information presentation and consumer recognition. DOE and EPA will work together to incorporate an energy efficiency label into improvements to the current FTC label (and future legislated DOE labels, where appropriate) as a primary tool for labeling and emphasizing high efficiency products. DOE will also work with the FTC to harmonize mandatory energy efficiency labeling, within multinational contexts, such as consistency with the requirements of NAFTA.

JOINT PROGRAM COMMUNICATIONS

It is desirable for the Government to utilize a single logo or label to designate high-efficiency products (products substantially more efficient than the minimum required). Both agencies agree that the ENERGY STAR logo, a mark owned by EPA, is suitable for this purpose. Therefore, EPA will allow DOE to utilize the ENERGY STAR logo and name to promote energy-efficient appliances and other products, as described in this MOU. The logo will be modified to include both agencies' names. Simple variations in the color or size of the logo, within limits required by law, regulation and court decisions, may be appropriate based on customers' needs for individual products, while maintaining the image of the name and logo to provide maximum communications impact.

It is important to preserve the integrity and meaning of the ENERGY STAR logo. Therefore, both agencies will oversee and ensure the proper use of the ENERGY STAR logo by their program participants, consistent with the requirements of 15 U.S.C. Chapter 22, various state laws on trademarks, and this MOU.

The ENERGY STAR logo and name will remain service marks of the US EPA. If EPA and DOE decide in the future to discontinue their coordination on product labeling, then only EPA will retain the right to use the ENERGY STAR logo and name.

MARY NICHOLS,
*Assistant Administrator for Air and
Radiation,
Environmental Protection Agency.*
CHRISTINE A. ERVIN,
*Assistant Secretary,
Energy Efficiency and Renewable
Energy,
Department of Energy.*

Senator CRAIG. Thank you.

Representative MCINTOSH. Thank you.

Let me call forward the third and final panel. We will follow the precedent that Senator Nickles set and go in the order that the panelists are listed on the hearing notice. The first witness will be Mr. Jerry Taylor, who is the director of Natural Resources Studies at the Cato Institute. The second is Mr. William Lash, who is a professor of law at George Mason University; and the third witness on this panel will be Mr. David Nemptzow. I hope I pronounced that correctly.

Mr. NEMTZOW. "NEM-so."

Representative MCINTOSH. "NEM-so."

Welcome to all of you. I will ask, since it is getting late, unanimous consent that your full written testimony be included in the record, but ask you to summarize it at least in 5 minutes, shorter if you can do so, and then we'll get a chance to go into the question and answer period.

Mr. Taylor.

STATEMENT OF JERRY TAYLOR, DIRECTOR, NATURAL RESOURCES STUDIES, CATO INSTITUTE

Mr. TAYLOR. Thank you, Mr. Chairman and distinguished members of the subcommittees. I want to begin by thanking both Senator Nickles and Congressman McIntosh for their kind invitation to testify today on the administration's compliance with the Government Performance and Results Act of 1993 in its budget request for the President's climate change technology initiative.

In my judgment, there are serious doubts about whether the administration has complied with the act in its budgetary request for global climate change programs. In this I can only echo Mr. Guerrero and report to the committee that, after spending a great deal of time looking at the April 20 report, it was very difficult to make heads or tails out of virtually any appropriation performance standard which I had expected to find, given the law which required that data by April 1st—excuse me, by February 1.

Perhaps most importantly, however, the performance yardsticks offered by the administration are so dubious and disconnected from reality that they discredit the programs themselves. If you are judging the merits of these programs based on how valuable they

are in reducing the potential effects of global climate change, you should seriously consider cutting the entire climate change technology initiative out of the Federal budget.

The administration for the most part offers improvements in energy efficiency as the performance measure for its climate change programs. While my written testimony goes into far greater detail, let me just for a moment mention the three most fundamental overriding programs for this performance metric.

First, carbon efficiency, not energy efficiency, should be the administration's central concern. If electricity were generated largely by natural gas or nuclear power, it would make little difference how efficient our end use technologies are. Greenhouse gas emissions would be minimized either way. Correspondingly, if electricity were generated largely by coal all the increased efficiency in the world would do relatively little to control total greenhouse gas emissions.

Consider for instance one specific example, advanced water heaters. Among the most efficient water heaters on the market are electric heat pumps, which are about three times more energy efficient than the most advanced gas water heaters. But because the electric heat pump is likely to be powered by coal, our predominant source of electricity, energy efficiency is of little value.

According to the DOE's own data, for instance, the electric heat pump would generate about 4,900 pounds of carbon dioxide a year, compared with about 3,900 pounds of carbon dioxide generated by the natural gas heater once the carbon contribution of the two fuel sources are considered. Yet it is the electric heat pump, not the natural gas heat pump, that would be subsidized and promoted by this climate change technology initiative.

Second, there is no relationship, no relationship, between energy efficiency and overall energy consumption or, for that matter, between energy efficiency and greenhouse gas emissions. The reason is that energy efficiency reduces the marginal cost of consuming energy. If the marginal cost of energy goes down, energy consumption at the margin will increase. The increased energy consumption that results will offset some, if not all, of the gains achieved by enhanced energy efficiency.

Economists refer to this phenomenon as the snapback effect and its existence has been thoroughly documented in the energy economics literature for years and years. It is often sometimes a shock to discuss this in Washington, but amongst academics this is old hat.

We could also see it in the macroeconomic data. Energy efficiency, if you measure it by total energy consumed per unit of GDP, actually improved 57 percent from 1949 through 1997. Yet total energy consumption increased by about 320 percent over that same period while greenhouse gas emissions increased by almost 250 percent. Increases or improvements in energy efficiency did not drive reductions in energy consumption or reductions in greenhouse gas emissions.

The only way to reduce energy consumption and thus greenhouse gas emissions is to make energy more expensive. The administration for some odd reason believes the exact opposite.

Finally, if the administration's program succeeds in reducing greenhouse gas emissions as advertised, it will make absolutely no difference to the economy or the environment. There are two fundamental questions we must ask when evaluating the ultimate work of the climate change technology initiative: First, how much will global warming be abated by these programs? Second, how will the American public benefit from this reduction in warming?

For the sake of argument, assume the administration's program meets every single one of its performance measures. Now, if every Nation meets its performance commitment under the Kyoto Protocol the world's most advanced climate model predicts that temperatures will be reduced by 0.07 degrees Celsius below where they otherwise would have been by 2050. Since the United States emits 20 percent of the world's greenhouse gases, we can infer that U.S. compliance with the Kyoto Protocol would reduce global temperatures by 0.014 degrees Celsius.

Now, according to EPA and DOE about 65 percent of the greenhouse gas emissions reductions required of the United States can be met through the budgetary programs we are discussing today. Even though I think that number is quite outlandish, let us accept it. A back of the envelope calculation reveals that the climate change technology initiative, then, will reduce temperatures by 0.0091 degrees Celsius, in other words 16 one-thousandths of a degree Fahrenheit below where temperatures would otherwise be, by 2050.

This, I submit to the subcommittee, is what is known as a performance metric. Such a change in temperature is simply too small to measure. Moreover, I defy the administration to argue that this infinitesimal reduction in temperature would affect the lives of the American people one whit.

In short, the administration's plan is built upon false assumptions, economic ignorance, and inconsequential goals. The climate change technology initiative is not worth a nickel, much less \$4.4 billion a year of budgetary increase.

Thank you for your patience and I look forward to answering any questions you may have.

[The prepared statement of Mr. Taylor follows:]

PREPARED STATEMENT OF JERRY TAYLOR, DIRECTOR, NATURAL RESOURCE STUDIES,
CATO INSTITUTE

I'd like to thank the members of the Subcommittee on Energy Research, Development, Production, and Regulation and the Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs for the opportunity to testify today on the administration's compliance with statutory requirements relating to their budget requests to address global climate change.

My remarks today will examine the administration's compliance with the Government Performance and Results Act (GPRA) of 1993 as it relates to global climate change programs in this year's budget request, primarily the budget requests of the U.S. Department of Energy (DOE) and the U.S. Environmental Protection Agency (EPA). In sum, I believe that the administration is not in compliance with the stipulations of that Act. In particular:

- No concrete performance or results measures are provided for most of the DOE or EPA budget accounts in which the administration seeks increased appropriations to address global climate change;
- Where concrete performance and results measures are provided, they are founded upon dubious analysis and are without solid foundation; and

- Where concrete performance and results measures are provided, they are disconnected from any assessment of their value to the national economy or to public health, rendering them of little use to the public.

INTRODUCTION TO THE GPRA

The Government Performance and Results Act of 1993 directs federal agencies to offer “objective, quantifiable, and measurable” goals for each of their appropriation accounts during the budget process. It was enacted to “systematically hold federal agencies accountable for achieving program results.” The Act is ambitious. It attempts to promote, when possible, real-time budget accountability that the public can grasp. As *The National Journal* explains, the GPRA requires “specific performance measurers [such] as increasing the lead time on tornado warnings from 8 minutes in 1994 to 11 minutes in 1997, with accuracy growing from 53 to 66 percent.”

In sum, the GPRA demands that performance measures be specific, quantifiable, measurable, and directly connected when possible to the well being of the American people. As President Clinton remarked when he signed the Act into law, we need to ask:

Does this work? Is it changing people’s lives for the better? Can we say after we take money and put it into a certain endeavor that it was worth actually [taking] away from the taxpayers [and putting] into this endeavor and [that] their lives are better [sic]? These may seem like simple questions, but for decades they haven’t been answered in a very satisfactory way. We are determined to do that.¹

FEDERAL CLIMATE CHANGE EXPENDITURES AND PERFORMANCE METRICS

Rather than provide performance and results measures for each appropriations account, the administration in its April 20, 1999 report to Congress offers performance and results metrics on a program-by-program basis. This makes it difficult to examine the performance metric for any specific appropriations account given that each appropriations account is typically involved in a myriad of programs. Accountability thus suffers and outside analysts are largely unable to zero-in on specific budgetary successes and failures. This alone should be a red flag to lawmakers that something is amiss.

That having been said, the administration chooses to organize its activities to address global climate change in four major programs: the Climate Change Technology Initiative (CCTI); the U.S. Global Change Research Program; International Assistance programs; and other more tangentially climate-related programs. I briefly discuss the three DOE-EPA related program elements below.

Climate change technology initiative

The CCTI is made up of an amalgamation of tax credits for energy efficiency and renewable energy investments, energy efficiency and renewable energy R&D, labeling and public awareness programs, demonstration projects, industry subsidies, and regulatory programs to mandate tighter energy efficiency standards for appliances and machine equipment. Five separate cabinet departments and over a dozen appropriation accounts are involved in the CCTI.²

Instead of providing performance and results measures for each of the appropriations accounts engaged in the CCTI, the administration provides performance and results measures for each industrial sector targeted by the CCTI. The administration primarily suggests that increases in energy efficiency will be the main program output of the CCTI. It then calculates how many tons of carbon emissions will be saved by this increased efficiency.

According to the administration, the EPA’s activities will reduce energy consumption by approximately 59 billion-kilowatt hours and thereby reduce greenhouse gases by 58 million metric tons of carbon equivalent next year. By 2010, the administration suggests that those programs will reduce greenhouse gas emissions by 354 million metric tons of carbon equivalent. Likewise, the administration believes that

¹ William Jefferson Clinton, remarks on signing the Government Performance and Results Act of 1993 and an exchange with reporters, “Public Papers of the Presidents,” August 3, 1993.

² The DOE is engaged through its solar and renewable R&D appropriations account, the nuclear energy appropriations account, the energy conservation appropriations account, the fossil fuel R&D appropriations account, the science appropriations account, and the Energy Information Agency appropriations account. The EPA is engaged through its environmental programs and management account and its science and technology account. The U.S. Department of Agriculture (USDA), the Department of Housing and Urban Development (HUD), and the Department of Commerce are also involved to a lesser degree in the CCTI.

DOE's activities will reduce greenhouse gas emissions by 112 million metric tons of carbon equivalent by the year 2010.

U.S. Global Change Research Program

The U.S. Global Change Research Program involves six separate cabinet departments (the Department of Health and Human Services, DOE, USDA, the Department of Commerce, the Department of the Interior, and EPA) and three agencies (the National Aeronautics and Space Administration, the National Science Foundation, and the Smithsonian Institution). Virtually no concrete performance or result measures are provided by the administration for the various activities of this program, much less for the various appropriation accounts of the DOE (biological and environmental research) or the EPA (general science and technology work).

Other climate-related programs

The DOE and EPA are engaged in a host of disparate programs that the administration considers related to global climate change. DOE programs include the Weatherization Assistance Program (which subsidizes energy efficiency investment for low income households) and general R&D directed to coal, natural gas, and nuclear technologies, and the Partnership for a New Generation of Vehicles. EPA programs include the Clean Air Partnership Fund. Myriad appropriation accounts are involved from both agencies, yet no concrete performance or result measures are provided by the administration for the various activities of this program, much less for the various appropriation accounts of the DOE or the EPA.

INAPPROPRIATE PERFORMANCE AND RESULTS MEASURES

There are so many problems with the performance and results measures offered by both the DOE and EPA that it's difficult to know where to begin. I will start with the smaller problems first.

No third-party verification is possible

Congress will find it impossible to ascertain whether the administration's performance goals have been met because both the DOE and EPA rely heavily upon conjecture, assertions, and theoretical—not actual—measurements of performance.

First, the administration relies upon engineering calculations to estimate energy savings for the technologies it claims responsibility for in the marketplace. The actual performance of technologies is unexamined. Numerous studies at the state and local level demonstrate that engineering calculations are wildly inaccurate predictors of the performance of technologies.³ Indeed, they typically overestimate energy savings by a large degree.

Second, DOE and EPA programs implicitly assume that, were it not for those programs, the worthy technologies being subsidized would not attract enough research, development, or marketing dollars to penetrate the marketplace. In other words, both departments take full responsibility and credit for the technologies being promoted. This, of course, ignores the possibility that "free riders" are being attracted to the programs (it's certainly possible that some of the technologies in question would have been produced by the market without government help; perhaps immediately, perhaps only a few years down the road), or that the federal assistance perhaps contributed only at the margin and thus is due only a small part of the credit and not the full degree of credit sought by the DOE and EPA. In fact, when the U.S. General Accounting Office reviewed a recent document by the DOE regarding its R&D success stories, it found that such faulty assumptions destroyed the credibility of DOE cost benefit analyses.⁴

The Energy Information Administration recognizes the difficulty of connecting government R&D subsidies to concrete performance goals. In testimony last month, EIA administrator Jay Hakes frankly conceded that "we are not able to link research and development expenditures directly to program results or to separate impacts of incremental funding requested for FY 2000 from ongoing government expenditures."⁵ Likewise, Hakes noted that "it is also difficult to analyze the impacts

³Paul L. Joskow and Donald B. Marron, "What Does a Negawatt Really Cost?" *The Energy Journal* 13 (Issue 4, 1992): 1-34; Albert L. Nichols, "Demand-side Management: Overcoming Market Barriers or Obscuring Real Costs?" *Energy Policy* 22 (October 1994): 840-847; and Franz Wirl, *The Economics of Conservation Programs* (Boston, MA: Kluwer Academic Publishers, 1997).

⁴U.S. General Accounting Office, "Energy R&D: Observations on DOE's Success Stories Report," testimony before the Subcommittee on Energy and Environment, Committee on Science, House of Representatives, April 17, 1996, (GAO/T-RCED-96-133).

⁵Jay Hakes, testimony before the Subcommittee on Energy and Environment, Committee on Science, House of Representatives, April 15, 1999.

of information programs, voluntary initiatives, and partnerships on realized technology development and deployment.”⁶

Thus, Congress will find it impossible to verify whether most CCTI programs actually achieved the goals laid out by the administration.

Flawed cost-benefit analysis

While the GPRA does not require cost-benefit analysis for appropriation accounts, the administration frequently offers benefit estimates for the various programs of the CCTI. Typical is the administration’s claim that a 20 percent tax credit to encourage the purchase of residential electric heat pumps and air conditioners will benefit the economy by encouraging investments that will ultimately save consumers billions of dollars in energy costs.

The claim is misleading because it is divorced from any discussion of the investment required to obtain those energy savings. For instance, the EIA estimates that the cost of a current model heat pump is \$4,400 while the cost of a model that would qualify for the tax credit is \$5,500 (the 20 percent tax credit would, conveniently enough, cover the differential in cost). EIA data suggests that the energy-efficient heat pump will save an average of 1,676 kWh per year on average. Assuming a 10 percent discount rate, electricity prices of 8.3 cents per kWh, and an 11-year operating life for the heat pump, the consumer will save a total of \$783 in energy costs.⁷ At the very least, spending \$1,100 to save \$783 hardly represents a net plus for the economy. The calculation also indicates that “market barriers” are not necessarily the primary obstacles faced by many energy efficient technologies; high cost is.

A calculation of consumer benefit would require a consideration of total costs: in this case, \$1,100 times the total number of rebates provided plus management expenses that would probably add another 10-15 percent. The total consumer benefit from purchasing the more efficient heat pump would require a calculation of the total willingness to pay minus actual payments. Once we consider the fact that a number of participants are likely to be “free riders” (households that would have purchased the technology even without the rebate), it’s likely that the benefit to consumers who otherwise would not have purchased the heat pump save for the tax credit will be one-half the cost or less.

For the purposes of the CCTI, however, a cost-benefit test requires us to consider the cost of the program in relation to the amount of greenhouse gas emission reductions achieved. In this case, dividing the cost of the tax credit (\$1,100) by the amount of greenhouse gas emissions avoided through more efficient energy use results in a total cost of \$349 per ton. With a 10 percent discount rate, the cost of reducing greenhouse gas emissions via the tax credit rises to \$666 per ton.⁸

Since no credible economist would support a carbon tax of \$666 per ton to reduce greenhouse gas emissions (most proposals range from \$5-50 per ton), why should the Congress accept a program that levies an implicit tax that they wouldn’t be caught dead advocating explicitly?

Contrast the above calculation with the administration’s argument that for every tax dollar invested in the CCTI, \$70 dollars of economic benefits will result (if such figures were actually seriously believed, one could make a pretty strong argument that ALL discretionary federal spending should be plowed into the CCTI). If the administration is determined to argue the economic merits of the CCTI, it appears that a refresher course in Econ 101 would be in order.

Programs aim at solving problems that do not exist

Underlying the CCTI is the belief that market barriers—such as lack of information, shortage of investment capital, and inexplicably negative consumers biases against energy efficiency investments—prevent the market place from investing optimally in the technologies peddled by the two departments. The administration’s heavy reliance on product labeling, demonstration projects, public awareness, and subsidized research, development, and marketing is largely designed to overcome those market barriers. DOE and EPA’s energy efficiency performance goals will only succeed if those market barriers truly exist. Otherwise, consumers will continue to reject those technologies.

⁶ Ibid.

⁷ Ronald Sutherland, “The Feasibility of ‘No Cost’ Efforts to Reduce Carbon Emissions in the U.S.,” American Petroleum Institute, forthcoming, p. 15. Even this calculation, however, is too generous because the marginal cost of electricity, rather than the average cost of electricity, is the appropriate consideration. Since marginal electricity costs are less than half average costs, Sutherland’s calculations overestimate the savings possible from the heat pump in question.

⁸ Ibid.

Economists, however, are deeply skeptical about the underlying assumptions of the CCTI.⁹ First, market barriers do not necessarily contribute to economic inefficiency or sub-optimal investment. As economist Ronald Sutherland explains, “A fallacy in the conservation paradigm is the presumption that market barriers produce inefficient outcomes that justify government policy. So-called market barriers may not be sources of inefficiency, but rather are benign characteristics of well functioning markets.”¹⁰

Second, studies of consumer behavior involving home heating and cooling find that the implicit rates of return used by consumers in making energy conservation investment decisions are consistent with returns available on other investments.¹¹

Third, the variance in energy prices over time creates uncertainty about the return on energy conservation investments. Because such investments are irreversible and much more illiquid than other investments, consumers rationally demand high returns on home conservation investments to compensate for the uncertainty that they face.¹²

Fourth, the estimates of alleged energy savings that consumers pass up are based on engineering estimates rather than actual changes in use. A study based on changes in actual use of electricity, rather than engineering estimates, concluded that consumers actually choose conservation investments rationally in light of the cost of capital and the returns on alternative investments.¹³

Think of the CCTI as being made up of a bunch of economic “carrots.” If the rabbits (consumers) cannot be induced by the “carrots” to purchase favored technologies, then the programs will largely fail. Since the administration’s “carrots” are designed to remedy problems that don’t exist, it’s unlikely that the technologies will gain enough consumer acceptance to make much difference in overall greenhouse gas emissions.

Performance measures are implausible on their face

The EPA estimates that its programs will reduce annual greenhouse gas emissions by 354 million metric tons of carbon equivalent by 2010.¹⁴ DOE estimates that its programs will reduce greenhouse gas emissions by another 112 million metric tons of carbon equivalent,¹⁵ yielding an estimated reduction of 452 million metric tons of greenhouse gas emissions by 2010. Those performance measures are so unrealistic that they cast doubt on the seriousness of the administration’s attempts to comply with the GPRA.

To put this in perspective, the DOE’s own “5-Labs” study estimates that a “high efficiency” scenario for the economy would reduce emissions by only 120 million metric tons of carbon equivalent by 2010. The EIA is less bold, suggesting that reductions of only 79 million metric tons of carbon equivalent are possible under a “high efficiency” economic scenario.

The fundamental explanation for the administration’s wildly inflated program estimates is two-fold. First, the administration overestimates the potential for government directed R&D, marketing, and technology deployment to improve economic performance. Second, it engages in unrealistic projections about the speed with which new technologies can migrate into the marketplace.

As to the former, the DOE and EPA evince the mind-set of those entering into a second marriage: the triumph of hope over experience. Numerous third-party examinations of the history of government technology-forcing programs conclude that programs such as the CCTI have failed miserably over the past 30 years.¹⁶ Typical is the assessment by M.I.T.’s Thomas Lee, Ben Ball, Jr., and Richard Tabors: “the experience of the 1970s and 1980s taught us that *if a technology is commercially*

⁹For overview of the debate see an issue of *Energy Policy* entirely devoted to the controversy (volume 22, number 10, October 1994) and “Markets for Energy Efficiency” A report of the Stanford Energy modeling Forum (Report 13, volume 1, September 1996).

¹⁰Sutherland, pp. 7-8.

¹¹Albert Nichols, “How Well Do Market Failures Support The Need For Demand Side Management?” (Cambridge, MA: National Economic Research Associates, August 12, 1992), pp. 22-24.

¹²Kevin Hassett and Gilbert Metcalf, “Energy Conservation Investment Do Consumers Discount the Future Correctly?” *Energy Policy* 21 (June 1993): 710-716. Gilbert Metcalf, “Economics and Rational Conservation Policy,” *Energy Policy* 22 (October 1994): 819-825.

¹³Nichols 1992, pp. 24-25 and Ruth Johnson and David Kaserman, “Housing Market Capitalization of Energy-Saving Durable Good Investments,” *Economic Inquiry* 21 (1983): 374-386.

¹⁴David Gardiner, testimony before the Subcommittee on Energy and Environment, Committee on Science, U.S. House of Representatives, April 14, 1999.

¹⁵Dan Reicher, testimony before the Subcommittee on Energy and Environment, Committee on Science, U.S. House of Representatives, April 14, 1999.

¹⁶See for instance Linda Cohen and Roger Noll, *The Technology Pork Barrel* (Washington: The Brookings Institution) 1991 and the U.S. General Accounting Office, 1996.

viable, then government support is not needed; and if a technology is not commercially viable, no amount of government support will make it so [emphasis in original].¹⁷

As to the latter, we need to remember that the potential for new energy-efficient technologies to reduce greenhouse gas emissions—especially within a decade—is limited because new technologies are only incremental additions to the capital stock, capital stock turns over slowly, and total capital stock increases with economic growth. Thus, even if the administration is correct about the benefits of their technology investments and promotional activities, there is only so much that those technologies can accomplish in the short or mid term.

The above problems are so severe that when the Energy Information Administration ran the administration's tax credit proposal through its computer models, it found that rebates proposed in the CCTI would reduce energy consumption by less than 0.1 percent and greenhouse gas emissions by 0.17 percent by 2010, figures far less than the performance measures offered by the administration.¹⁸

Moreover, when the President's Council of Economic Advisors (CEA) produced a plan to comply with the Kyoto Protocol at the lowest possible economic cost, they ignored the claims peddled by the DOE and EPA regarding the potential for the CCTI to significantly reduce greenhouse gas emissions. The CEA report instead relied upon a liberal emissions trading program to reduce greenhouse gases and made no mention of the CCTI's ability to contribute to Kyoto compliance.¹⁹ If the DOE and EPA claims of program savings could not persuade the administration's own economists to include them in its main planning document, they should probably not be taken seriously by Congress.

Energy efficiency may hinder carbon efficiency

Another fundamental problem with the CCTI its focus on energy efficiency rather than carbon efficiency. For instance, if electricity were generated largely by natural gas and nuclear power, it would make little difference how efficient our end-use technologies were; greenhouse gas emissions would be minimal either way. In fact, the President's Council of Economic Advisors relies upon the elimination of the domestic coal industry and the accelerated emergence of natural gas fired electricity to meet the standards of the Kyoto Protocol.²⁰ Correspondingly, if electricity were generated largely by coal, all the increased efficiency in the world would do little to control total greenhouse gas emissions.

Consider, for instance, advanced water heaters. Among the most efficient water heaters on the market are electric heat pumps with an "energy factor" of 1.65. The most efficient gas water heaters, however, have an "energy factor" of only .54. Under the administration's plan, the electric heat pump would qualify for a 20 percent tax credit and would be aggressively promoted to consumers by the government. According to the DOE's own data, however, the electric heat pump would generate 4,872 pounds of carbon dioxide a year compared to 3,862 pounds of carbon dioxide generated by the natural gas heater.²¹

The reason is simple. Approximately 70 percent of the total energy consumed by an appliance is actually consumed in the production, generation, transmission, and distribution of energy. Since more electricity is generated from coal than any other fuel source, the "energy efficient" electric heat pump would be inferior—from a greenhouse gas emissions standpoint—than the less efficient natural gas heat pump.

Energy efficiency improvements do not necessarily equal reductions in greenhouse gas emissions

Aside from the difficulty in reconciling energy efficiency with carbon efficiency, the suggestion that increased energy efficiency as a program output will lead to energy consumption as an intermediate outcome is questionable. The reason is that energy efficiency reduces the marginal cost of consuming energy. If the marginal

¹⁷Thomas Lee, Ben Balls, and Richard Tabors, *Energy Aftermath: How We Can Learn From the Blunders of the Past to Create a Hopeful Energy Future* (Boston: Harvard Business School Press, 1990) p. 167.

¹⁸Energy Information Administration, "Analysis of The Climate Change Technology Initiative," Office of Integrated Analysis and Forecasting, U.S. Department of Energy, SR/OIAF/99-01, April 1999.

¹⁹Council of Economic Advisors, "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis," July 1998.

²⁰Peter VanDoren, "The Costs of Reducing Carbon Emissions: An Examination of Administration Forecasts," Briefing Paper no. 44, Cato Institute, March 11, 1999.

²¹Data from "Energy Efficiency Standards for Consumer Products," technical support document published by the U.S. Department of Energy, 1993. Relayed by Charles Fritts, American Gas Association, private correspondence, May 17, 1999.

cost of energy goes down, energy consumption at the margin will increase. The increased energy consumption that results will offset some if not all the gains achieved by enhanced energy efficiency.

For example, assume that DOE helps develop and market an incredibly energy efficient air conditioner. The upshot for the residential consumers is that they will be able to substantially reduce the cost of keeping their homes at 75 degrees in the summertime. Perhaps, however, they are most comfortable if indoor temperatures are 70 degrees. They might not have been able to afford to keep the thermostat down that low in the past, but thanks to DOE's new air conditioner, now they can. So the thermostat is lowered, energy consumption increases, and the greenhouse gas emissions go back up.

Economists who have studied the phenomenon of energy efficiency and increased energy consumption (sometimes known as the "snap-back effect") have documented the relationship.²² We can also see it by examining macro-economic data. According to the EIA, energy efficiency (measured as total energy consumption per unit of GDP) improved by 57 percent from 1949-1997. Yet total energy consumption increased by 323 percent over that same period. Population growth, economic growth, and yes, the "snap-back" effect are the main reasons for the lack of correlation between energy efficiency and energy consumption.

No outcome measurements of success offered

Finally, the administration failed to comply with the spirit of the GPRA by refusing to directly connect the reduction of greenhouse gas emissions to the well being of the American people. Recall President Clinton's desire to ask of his budget, "Is it changing people's lives for the better? Can we say after we take money and put it into a certain endeavor that it was worth actually [taking] away from the taxpayers [and putting] into this endeavor and [that] their lives are better [sic]?" In the case of the CCTI, there are two appropriate questions to ask. First, how much global warming will be abated by these programs? Second, how will the American public then benefit from the alleviation of global warming?

In a spirit of generosity, I will attempt to do the administration's homework for them. For the sake of argument, assume my critique of the program is incorrect and the administration's claims can be taken at face value. Assume, therefore, that the CCTI meets all the performance measures and results offered by the administration.

If every nation meets its commitments under the Kyoto Protocol, the world's most advanced climate model predicts that temperatures will be 0.07 degrees Celsius cooler than they otherwise would be under a business as usual scenario by the year 2050.²³ Since the U.S. emits 20 percent of the world's greenhouse gases, we can infer that U.S. compliance with the Kyoto Protocol would reduce global temperatures by 0.014 degrees Celsius.²⁴ According to the DOE and EPA, their contribution to the CCTI will reduce greenhouse gas emissions by 452 million metric tons of carbon equivalent annually by 2010 (the midpoint of the Kyoto compliance period). That means that about 65 percent of the greenhouse gas emission reductions required of the United States under the Kyoto Protocol can be met through the budgetary programs we're discussing today, implying that the CCTI will reduce temperatures by .0091 degrees Celsius (16-1,000ths of a degree Fahrenheit) below where they otherwise would be by the year 2050.

Such a change in temperature is too small to measure. Moreover, I defy the administration to argue that this infinitesimal reduction in temperature will affect the lives of the American people one whit.

²² See, J.D. Khazzoom, "Economic Implications of Mandated Efficiency Standards," *The Energy Journal* no. 11, 1980, pp. 21-40; "Energy Savings Resulting from the Adoption of More Efficient Appliances," *The Energy Journal* no. 8, 1987, pp. 85-89; and "Energy Savings Resulting from the Adoption of More Efficient Appliances: A Rejoinder," *The Energy Journal* no. 10, 1989, pp. 157-166; H.D. Saunders, "The Khazzoom-Brooks Postulate and Neoclassical Growth," *The Energy Journal* no. 17, 1992, pp. 131-148; F.P. Sioshansi, "Do Diminishing Returns Apply to DSM?" *The Electricity Journal* Vol. 7, no. 4, 1994, pp. 70-79; Nichols 1992, p. 17; and Paul Joskow, "Utility Subsidized Energy-Efficiency Programs," *Annual Review of Energy and the Environment* no. 20, 1995, pp. 526-534, cited in David Kline et al., p. 449. Robert W. Crandall, "Corporate Average Fuel Economy Standards," *Journal Of Economic Perspectives* 6 (Spring 1992): 171-180 examines the same phenomenon in the context of regulations that mandate that cars use less gasoline per mile.

²³ Thomas Wigley, "The Kyoto Protocol: CO₂, CH₄, and Climate Implications," *Geophysical Research Letter* 25 (1998): 2285-88.

²⁴ Even this overstates things somewhat since most observers expect U.S. emissions to decline as a percentage of global emissions.

CONCLUSION

The importance of stepping back from the GPRA budgetary “trees” to appreciate the policy “forest” was perhaps best articulated by Wilhelm von Humboldt in his famous description of the intellectual opportunity costs of examinations such as ours today:

The administration of political affairs itself becomes in time so full of complications that it requires an incredible number of persons to devote their time to its supervision, in order that it may not fall into utter confusion. Now, by far the greater portion of these have to deal with the mere symbols and formulas of things; and thus, not only are men of first-rate capacity withdrawn from anything which gives scope to thinking, and useful hands are diverted from real work, but their intellectual powers themselves suffer from this partly empty, partly narrow employment.²⁵

There are serious doubts about whether the administration has complied with the GPRA in its budgetary request for its global climate change programs. But more importantly, there is no doubt that the performance and measurement yardsticks presented by the administration are so dubious and disconnected from reality that they discredit the programs themselves. Thank you for the opportunity to testify today and I look forward to answering any questions you may have.

Representative MCINTOSH. Thank you, Mr. Taylor.
Next, Professor Lash.

**STATEMENT OF WILLIAM H. LASH, III, PROFESSOR OF LAW,
GEORGE MASON UNIVERSITY, ARLINGTON, VA**

Mr. LASH. Thank you, Mr. Chairman, Senator Craig.

Due to the time constraints, I know I have 5 minutes. My testimony goes into the Knollenberg amendment, the CO₂ regulation by EPA, and EPA’s advocacy efforts. I want to focus my oral testimony, however, on the Knollenberg amendment discussions.

The Knollenberg amendment, we heard earlier, prohibits implementation of the Kyoto Protocol prior to Senate ratification by regulation, rules, orders or decrees by the executive branch. The EPA activities, however, have raised serious questions about the EPA’s compliance with limitations imposed by the amendment. Some maintain the provision bars any regulation the main effect of which is to reduce greenhouse gases. Others, mainly the EPA, maintain that it may regulate carbon dioxide and other greenhouse gases under existing statutory authority as long as the purpose of such regulation is not to implement the Kyoto Protocol.

The question naturally arises as to how it would be possible for Congress to distinguish between EPA regulations that only incidentally accomplish the purpose of the Kyoto Protocol and EPA regulations that are designed to implement the protocol under the guise of other statutory authorities.

The EPA position, that regulations accomplishing the purpose of the Kyoto Protocol are not necessarily implementation of the protocol, may be technically correct. However, EPA’s position is tantamount to saying that as long as the agency acts under the color of existing authority and does not truthfully report what it is doing it is in compliance with the Knollenberg amendment.

It is almost as if EPA says to Congress: If we lie about what we are doing, you cannot prove it because we always have a plausible legislative alibi. What this means, of course, is that Congress is entitled to suspect EPA of implementing the Kyoto Protocol any and

²⁵ Wilhelm von Humboldt, *The Limits of State Action*, J.W. Burrow, ed. (Indianapolis: Liberty Fund, 1993), pp. 29-30.

every time the agency proposes or issues any rule or regulation affecting CO₂.

Given the difficulties in drawing the line between regulations that accomplish some of the purposes of the protocol and regulations that implement the protocol, some observers may conclude that the Knollenberg amendment is unenforceable. Violations of the law are so hard to prove that EPA is left to police itself. In effect, the EPA would have to say: We have found we are guilty of violating the amendment; we are coming out and arresting ourselves. This obviously is unlikely.

Congress would not have passed the Knollenberg amendment just to enact such a nullity. It could not have possibly intended to enact a prohibition that EPA could simply evade by lying about what it is doing.

I believe that a review of the act, its legislative history, and the agency's actions suggests at a minimum EPA has flouted the spirit and the intent of the Knollenberg amendment. Of particular importance in evaluating this is a colloquy, Chairman McIntosh, between you and Representative Knollenberg. In the exchange, you may recall you asked for a clarification of the VA-HUD limitation language.

Your question: "Would the Knollenberg amendment also prohibit finalization of any rules, regulations, or orders implementing the Kyoto Protocol prior to Senate ratification, whether or not authorized by current law?"

To this Congressman Knollenberg replied: "Clearly, yes."

The author of the amendment intended it to preclude regulations implementing the Kyoto Protocol, even if those regulations were promulgated under the color of existing statutory authority. In light of the fact that the EPA chooses to interpret the Knollenberg amendment as a practical nullity, Congress should take another look at it. They should seriously consider strengthening the amendment and giving it, more importantly, teeth.

For example, Congress should consider prohibiting EPA from proposing or issuing any regulations or orders that significantly constrain CO₂ emissions without first obtaining positive approval from Congress by means of an up or down vote. In addition, EPA should be required to report to Congress any proposed rule, regulation, decree, or order that may affect greenhouse gas emissions by more than a non-significant amount. This information should be published in the Federal Register and combined in the annual reports.

We heard earlier from Congressman Knollenberg about the advocacy elements of EPA's campaign toward Kyoto and the regulation of CO₂. This body has warned EPA repeatedly not to cross the line between advocacy and education. As an educator, I know the difference. You are talking about balance, you are talking about providing both perspectives.

Unfortunately, if you review a series of EPA programs both prior to and after the Knollenberg amendment, we find that the EPA is absolutely clueless as to what education is. Balance is something that has totally been ignored by the EPA unless reminded by Congress. EPA programs such as "Cool Facts About Global Warming" and a review of EPA materials about conferences held nationwide

indicate a history of multiple voices screaming in favor of Kyoto with one lone voice or at most two saying we have some questions here.

My colleagues like Mr. Taylor were not permitted to come forward with the scientific or economic evidence about Kyoto. Legislative histories about Kyoto are not addressed. What we are hearing is simply the urgency of Kyoto, the science of Kyoto, the dire consequences of Kyoto. I do not think balance means having 1 out of 15 voices. Balance requires giving both sides some attention.

I think this body needs to review EPA advocacy efforts and make them come clean on their conferences and ensure that they are giving the balance that the American people are paying for.

Thank you for your time. I would be glad to take any questions about my testimony.

[The prepared statement of Mr. Lash follows:]

PREPARED STATEMENT OF WILLIAM H. LASH, III, PROFESSOR OF LAW,
GEORGE MASON UNIVERSITY, ARLINGTON, VA

Good afternoon, Mr. Chairman, members of the subcommittees. My name is William H. Lash, III and I am Professor of Law, George Mason University, Arlington, Virginia and Distinguished Senior Fellow with the Center for the Study of American Business, Washington University, St. Louis, Missouri.¹ I am delighted to appear before the subcommittees to discuss the intent behind, and the probable violation by the EPA of the 1999 Departments of Veterans Affairs and Housing and Urban Development, and Independent Agencies Appropriations Act limitation (popularly referred to as the Knollenberg Amendment.)

The Knollenberg Amendment prohibits implementation of the Kyoto Protocol prior to Senate ratification via regulation, rules, orders, or decrees by the executive branch. Recent EPA activities, however, have raised questions about the EPA's compliance with the limitations imposed by the Knollenberg Amendment. Some maintain the provision bars any regulation the main effect of which is to reduce greenhouse gases. Others, including the EPA, maintain that the agency may regulate carbon dioxide and other greenhouse gases under existing statutory authorities as long as the purpose of such regulation is not to implement the Kyoto Protocol. The question naturally arises as to how it would be possible for Congress to distinguish between EPA regulations that only incidentally accomplish the purposes of the Kyoto Protocol and EPA regulations that are designed to implement the Protocol under the guise of other statutory programs.

The EPA position that regulations accomplishing the purposes of the Kyoto Protocol are not necessarily implementation of the Kyoto Protocol may be technically correct. However, EPA's position is tantamount to saying that as long as the agency acts under the color of existing authority, and does not truthfully report what it is doing, it is in compliance with the Knollenberg Amendment. It is as though EPA had said to Congress, "If we lie about what we are doing, you will never be able to prove it, because we'll always have a plausible alibi." What this means, of course, is that Congress is entitled to suspect EPA of implementing the Kyoto Protocol any and every time the agency proposes or issues any rule or regulation affecting CO₂.

Given the difficulty in drawing the line between regulations that accomplish the purposes of the Kyoto Protocol and regulations that implement the Kyoto Protocol, some observers conclude that the Knollenberg Amendment is unenforceable. Violations of the law are so hard to prove that the EPA is left to police itself. In effect, the EPA would have to catch itself in the act of implementing the Kyoto Protocol and surrender itself to Congress. I think this interpretation goes too far. Congress would not have passed the Knollenberg Amendment just to enact a nullity. It could not possibly have intended to enact a prohibition that EPA could effortlessly evade just by lying about what it is doing. I believe that a review of the Act, the legislative history, and the agency's actions suggest, at a minimum, that EPA has flouted the spirit and intent of the Knollenberg Amendment.

Of particular importance in interpreting the Knollenberg Amendment is a colloquy between Rep. David McIntosh and Rep. Knollenberg subsequent to the

¹My comments reflect my own views and are not necessarily the views of either George Mason University or Washington University.

Amendment's passage. In this exchange, Rep. McIntosh asks for a clarification of the VA/HUD limitation language: [W]ould [the Knollenberg Amendment] also prohibit the finalization of any rules, regulations, or orders implementing the Kyoto Protocol prior to Senate ratification, whether or not authorized by current law?" To this Rep. Knollenberg replies "Yes." Clearly, the author of the Amendment intended it to preclude regulations implementing the Kyoto Protocol, even if those regulations were promulgated under the color of existing statutory authority.

However, in light of the fact that EPA chooses to interpret the Knollenberg Amendment as a practical nullity, Congress should seriously consider strengthening the Amendment to give it more teeth. For example, Congress should consider prohibiting EPA from proposing or issuing any that significantly constrains carbon dioxide emissions without first obtaining positive approval from Congress by means of an up-or-down vote. In addition, EPA should be required to report to Congress any proposed rule, regulation, decree, or order that may affect greenhouse gas emissions by more than some non-trivial amount. This information should be published in the Federal Register and combined into a yearly report.

CONGRESSIONAL ADMONITIONS TO EPA REGARDING KYOTO

On July 29, 1997, the United States Senate loudly and clearly by a 95-0 vote passed the Byrd-Hagel Resolution stating that the U.S. should not be a signatory to the Kyoto Protocol unless it included new specific scheduled commitments to limit or reduce greenhouse gas emissions for Developing Country Parties within the compliance period and would not result in serious harm to the economy of the United States.²

The Administration's outright defiance of the Senate's unanimously expressed advice, the large proposed funding increase for climate change programs in the FY 1999 budget, the series of EPA-sponsored "educational" events that were largely pro-Kyoto advocacy, and various actions that suggested an intent to regulate CO₂ provoked a strong Congressional reaction, resulting in the Knollenberg Amendment. The Conference report to the VA-HUD Appropriation Act recognized that funds may be expended to conduct bona fide educational activities and seminars by the Agency. However, during the House of Representatives debate, Rep. Knollenberg observed, "much of the EPA's past problems have stemmed from its inability to present information in an objective and balanced manner. If information is presented without allowing the airing of both sides, it ceases to be education, and becomes advocacy. There is a fine line between education and advocacy, and the EPA must recognize this distinction and refrain from crossing this line."³ Rep. Obey further admonished: "And if the agency goes across the line into advocacy, it does so at its own peril."⁴

The Conference Report gave the EPA additional guidance, stating, "To the extent future funding request may be submitted which would increase funding for climate change activities prior to Senate consideration of the Kyoto Protocol, the Administration must do a better job of explaining the components of the programs, their anticipated goals and objectives, the justification for any funding increases, a discussion of how successes will be measured, and a clear definition of how these programs are justified by goals and objectives independent of implementation of the Kyoto Protocol." Throughout 1998 neither Congress nor the American people had any reliable way of knowing what EPA planned to do with the tax dollars appropriated for climate change programs. Other witnesses at today's hearing will consider whether real transparency and accountability has been achieved.

REGULATION OF CO₂ UNDER THE CLEAN AIR ACT

Regulation and reduction of greenhouse gas emission are the keystone of the Kyoto Protocol. CO₂, a naturally occurring substance that we exhale every day is a so-called greenhouse gas that has not been subject to regulation by the EPA. However, in a legal memorandum dated April 10, 1998, EPA General Counsel Jonathan Z. Cannon advised the EPA Administrator that the Clean Air Act granted the EPA power to regulate emissions of carbon dioxide. The legal opinion stated that "CO₂ emissions are within the scope of EPA's authority to regulate."⁵

The EPA on April 15, 1999 announced that pursuant to the settlement of litigation with the Natural Resources Defense Council (NRDC), it would study control strategies for regulating CO₂ as an air pollutant. Rep. Sensenbrenner stated in a

²S.Res. 98, 105th Cong. 1st Sess. 1997.

³Cong. Record, July 29, 1998, H6575.

⁴Cong. Record, July 23, 1998, H6222.

⁵Jonathan Z. Cannon, Memorandum on EPA's Authority to Regulate Pollutants Emitted by Electric Power Generation Sources to Carol Browner, EPA Administrator, April 10, 1998.

June 25, 1998 letter to EPA Administrator Carol Browner that the settlement agreement was in reality “a step toward” implementation of the Kyoto Protocol. Rep. Sensenbrenner noted that “Congress, in enacting section 112 of the Clean Air Act, did not list CO₂ as a hazardous air pollutant and I do not believe that EPA has amended that list to include CO₂.”⁶

The NRDC-EPA settlement agreement modifies an October 26, 1994 consent agreement. CO₂ was not even mentioned in the earlier agreement, which stems from a September 1992 lawsuit predating both the Kyoto Protocol and the initial Conference of the Parties to the United Nations Framework Convention on Climate Change. Rep. Sensenbrenner therefore found it difficult to comprehend the relevance of the original consent decree to any emissions subject to the Convention or the Protocol, particularly since EPA never recognized CO₂ as a pollutant in 1994.⁷

The original 1994 settlement agreement stemmed from a complaint by the NRDC that the EPA had violated Section 112 of the Clean Air Act by failing to list and regulate as sources of hazardous pollution marine loading facilities and electric utility steam-generating units.⁸ Under the original settlement agreement, EPA agreed to undertake a Section 112(n)(1)(A) health effects study and report. This report would include the Agency’s determination whether there is a need to regulate electric utility steam generating units under Section 112. In the event that EPA determined that there was a need to regulate, EPA was obligated to promulgate regulations for the source category pursuant to a set timetable.

The modified settlement agreement, coming nearly four years after the original agreement, is a significant departure from the original. The new agreement would direct EPA to: “undertake on or before May 1, 1998, an analysis of the emission reductions of SO₂, NO_x, CO₂ and mercury (and the effect on mercury removal costs) that would be achieved through an array of strategies to control SO₂, NO_x, CO₂ and mercury, and shall be published such completed analysis on or before February 28, 1999.”⁹

To repeat, CO₂ is not regulated as a pollutant under any provision of the Clean Air Act. So why does EPA propose to study, inter alia, strategies for regulating CO₂?

EPA Administrator Carol Browner, in an August 8, 1998 letter to Rep. Sensenbrenner, explained that “the proposed analysis is specifically intended to inform EPA’s decisions under the Clean Air Act concerning regulation of mercury emissions from steam electric power plants.” According to her, “in this exercise EPA will evaluate how much reduction in mercury would result (and at what costs) from various possible scenarios to control mercury. Those model runs would also estimate the reductions in other pollutants (NO_x, SO₂, and CO₂) that would result from these possible mercury control scenarios.”¹⁰ She concluded, “it makes good common sense to undertake the analysis called for in the proposed settlement agreement.”¹¹

I’d like to offer a different assessment. Given the fact that CO₂ is not regulated under any provision of the Clean Air Act, even studying the CO₂ effects of control strategies for regulating mercury is suspicious. However, examining control strategies for regulating CO₂ is completely inappropriate. This is not how to settle a lawsuit alleging EPA’s failure to list and regulate sources of mercury emissions. It is not how to protect the public from the environmental hazards posed by mercury emissions. It is, however, the way to lay the groundwork for regulation of CO₂ and implementation of the Kyoto Protocol.

Unsurprisingly, the EPA denies that the planned CO₂ analysis is a first step towards implementation of the Kyoto treaty. However, the NRDC, the plaintiff in the modified settlement agreement, makes a conflicting statement. According to Dan Lashoff of the NRDC, “It’s intended to look ahead to emissions reductions of carbon dioxide and other pollutants that may be required to achieve national objectives as established by the treaty.” Lashoff notes, “It’s only common sense to take action to reduce greenhouse gas pollution beginning as soon as possible.”¹²

Although the EPA states that it has no plans to list CO₂ as a hazardous air pollutant under section 112 of the Clean Air Act, the timing of the agreement—a mere five days after release of the EPA General Counsel’s CO₂ memorandum—hardly

⁶ Rep. F.J. Sensenbrenner, Jr., Letter to EPA Administrator, Carol Browner, June 25, 1998.

⁷ Rep. F.J. Sensenbrenner, Jr., Letter to EPA Administrator, Carol Browner, June 25, 1998.

⁸ Section 112 of the Clean Air Act directs the EPA to list, and regulate, sources of hazardous air pollutants. Hazardous air pollutants are those substances included on the list established in Section 112(b).

⁹ Proposed Settlement Agreement, paragraph 1.

¹⁰ EPA Response to June 25, 1998 Inquiry from Representative Sensenbrenner.

¹¹ Letter from EPA Administrator Carol Browner to Rep. F. James Sensenbrenner, August 8, 1998.

¹² Patrice Hill “GOP lawmakers try to block use of global-warming treaty; White House threatens to veto funding bill containing ban,” Washington Times, July 8, 1998, pg A5.

seems coincidental. Rather, we may suspect, the agency was attempting to ratify, through a consent agreement, its tortured interpretation of the Clean Air Act.

Would NRDC and EPA, plaintiff and defendant, work hand in glove to advance a shared regulatory agenda? Stranger things have happened. The agency and environmental activists are not in a true adversarial relationship. Indeed, the EPA is a major financial supporter of the NRDC. According to EPA Grants Information, the agency has contributed \$729,251 to the NRDC since 1995.¹³ The modified settlement agreement may be a facile device to support and further justify the earlier opinion by the EPA General Counsel in furtherance of a joint mission to implement Kyoto.

Congress has not delegated to EPA the authority to regulate CO₂ as a pollutant. In its zeal to “make good policy,” EPA attempted to usurp Congressional authority. This seems to have become something of a habit. A recent opinion by the United States Courts of Appeals for the District of Columbia Circuit determined that EPA assumed “an unconstitutional delegation of legislative power” when promulgating the new NAAQS standards under the Clean Air.¹⁴

EPA’s attempt to “research” CO₂ regulation under the cover of a settlement agreement undermines the spirit of the Byrd-Hagel resolution. Additionally, it calls into question the candor of EPA and other agency assurances that the Administration has no intention of implementing Kyoto prior to its ratification by the Senate.¹⁵

ADDITIONAL EPA EFFORTS TO IMPLEMENT KYOTO

Other suspicious EPA regulatory behavior is worth noting. On March 3, 1999, the EPA announced a Final Rule for “Protection of Stratospheric Ozone; Refrigerant Recycling; Substitute Refrigerants.”¹⁶ These new rules establish sales restrictions on HFC and PFC refrigerants and would ban the “manufacture in or import into” the U.S. of certain devices, including “self-chilling cans.” Not, however, because the chemicals used in the devices would deplete the ozone layer, but because of their supposed contribution to global warming. It is questionable whether the EPA has the legal authority to consider the greenhouse warming potential of a refrigerant as a basis for proscribing its use under Section 612 of the Clean Air Act.

EPA ADVOCACY EFFORTS TO PROMOTE KYOTO

The EPA’s climate change information activities, conferences and seminars exhibit persistent imbalance and definitely cross the fine line separating education from advocacy. The EPA’s conferences on climate change heavily promote and favor the message of Kyoto. From New York to Florida to New Mexico, EPA seminars have been consistently biased towards Kyoto. For example, an EPA report on the June 23, 1998 EPA Regional Conference on Global Warming featured a host of speakers from the agency, academia, industry and state and local government. No speakers were present to offer an alternative to the Administration’s economic analysis or scientific assessment. Instead, taxpayers seeking more information on the issue of climate change and Kyoto were told by Bill White, Senior Advisor on Climate Change to EPA Administrator Carol Browner that Kyoto was an “important achievement in the best interest of the United States and the global environment.” Anthony Masiello, Mayor of Buffalo, New York warned attendees that “global warming could have negative impacts on many of our regions’ strengths, assets, and resources.” In a concluding plea for activism, EPA Regional Administrator Jeanne Fox stressed the importance of “educating” the public on global warming. She stated, “We need to help people understand that the road we’re heading down is one of great danger, and we must change that course.”¹⁷

More recently, an April 28, 1999 EPA conference in Kansas City, Missouri exhibited similar bias towards Kyoto, with just one lone speaker questioning the Administration’s views. That speaker was invited to participate at the last minute only because of the forceful intervention of Congresswoman Jo Ann Emerson, who complained in a letter to Carol Browner about the closed and one-sided nature of the agenda. One contrarian is better than none, but the event was still hugely unbalanced.

¹³ See James Sheehan, “Cashing in on Global Warming,” Competitive Enterprise Institute, June 1998.

¹⁴ *American Trucking Ass’ns, Inc v. United States EPA*, 1999 U.S. App. Lexis 9064 (1999.)

¹⁵ Testimony of Stuart Eizenstat, Undersecretary of State for Economic, Business and Agricultural Affairs before the Senate Foreign Relations Committee, February 11, 1998.

¹⁶ 64 FR 10374, March 3, 1999.

¹⁷ Report on the June 23, 1998 EPA Regional Conference sponsored by the EPA Office of Policy, Office of Economy and Environment.

The difference between education and advocacy is balance and accuracy. Balance does not mean one dissenting voice out of fifteen. Granted, agencies do not exist to host debates about the merits of the Administration's policies. However, when it comes to EPA and climate change policy, there has not even been the pretense of a hint of balance without external pressure.

EPA materials are similarly one-sided. EPA documents such as "Cool Facts About Global Warming" fail to provide even passing reference to the uncertainties and conflicts within the scientific community regarding climate change. Clearly, the agency does not understand the difference between advocacy and education. Federal employees and taxpayer dollars are being used as part of a campaign to sway public sentiment in favor of a treaty that the Senate has preemptively rejected.

What should Congress do? First, investigate the materials and programs promoted by the EPA and distributed to the public on global warming. The General Accounting Office should undertake an investigation of these advocacy activities.

In summary, the EPA is in desperate need of monitoring. I strongly recommend that Congress review these taxpayer funded programs to ensure balance, accuracy and to verify the amount of funds being spent. Congress should nip any attempts made by the administration to implement Kyoto via the backdoor by regulation of CO₂ or other actions in contempt of the Knollenberg Amendment.

Representative MCINTOSH. Thank you, Professor Lash. I appreciate that testimony, and the entire written testimony will be included in the record.

Our final witness for the panel and for today's hearing is Mr. David Nemptzow. Is that correct, I hope?

STATEMENT OF DAVID NEMTZOW, PRESIDENT, ALLIANCE TO SAVE ENERGY

Mr. NEMTZOW. Yes, sir.

Representative MCINTOSH. Good. Thank you, Mr. Nemptzow. Please summarize your testimony for us.

Mr. NEMTZOW. Thank you very much. Thank you, Chairman McIntosh and Senator Craig, for allowing me to testify before you today at this important hearing.

I am David Nemptzow—that is how we say it in the New World—president of the Alliance to Save Energy. We are a bipartisan, non-profit coalition of business, government, environmental, and consumer leaders who were founded by your colleagues, Senator Craig, Charles Percy and Hubert Humphrey in 1977, and we are chaired today by Senators Bingaman and Jeffords and Congressmen Porter and Markey. We have over 20 years of experience evaluating programs like these. 70 companies are now members of the Alliance to Save Energy, and if it pleases the chairman I would like to include a complete list of our members into the record for this hearing.

Representative MCINTOSH. Seeing no objection, we will definitely include that.

Mr. NEMTZOW. Thank you.

I think it is important to remember as you look at these programs and their history, to remember the bipartisan nature with which energy efficiency has been embraced in this country. In the Alliance's case it was bipartisan, with Senators Percy and Humphrey, and on a national level it was President Ronald Reagan who signed the National Appliance Energy Conservation Act that set in place many of these standards, and President Bush who inaugurated the Green Lights program and increased the budgets for these agencies and who signed, with the work that you and your colleagues have done, what became the Energy Policy Act of 1992,

and of course now President Clinton has suggested increased budgets for enhanced programs.

Long before President Clinton suggested that climate was a rationale for these programs, these programs were around, they were saving energy for America, they were saving money for American consumers. I think it is important to remember that.

I would like to say just three things today in my oral testimony. One is that these programs have had wide appeal in America on a bipartisan basis. No. 2, they have been working and they have been working quite well. No. 3, that energy efficiency really is the no-regrets strategy to responding to these tough challenges, and I will explain what I mean by that.

First of all, we must remember over 90 percent of the carbon that is emitted every year by this country is emitted from the production or consumption of energy. So that is why it is entirely appropriate for energy decisions and climate decisions to be made at the same time. We saw Assistant Administrator Gardiner's data that 60 percent of the greenhouse gas emissions in 2010 will be emitted from equipment and vehicles and buildings that have not even been purchased yet. So those decisions are still in front of us.

So it is important to say why is energy efficiency an appropriate climate strategy? One, it is big. It can save enormous amounts of carbon dioxide. The different studies have different results, but it is at least half and probably more.

Two, it is cost effective. That means you spend a little more money up front. It is like putting more insulation in your attic. You spend a few dollars up front, but it saves you money for years, if not decades, to come. You pay yourself back at the same time you are getting clean air.

Three, all these other benefits of energy efficiency: improving the U.S.'s competitiveness in the world economy, local air quality, affordable housing, and cutting oil imports. That is why we call it "no regrets." Regardless of what you think of climate, regardless of what you think of Kyoto, energy efficiency has these myriad other benefits that have been very helpful in the past and very encouraging for the future.

I hope now you are saying, well, if this is all so great can we not just let the marketplace do it? I wish that were the case. Unfortunately, it is not. You know well that in order to function the marketplace must have a series of requirements, first laid out by Adam Smith in the 18th century and still true today. Some of those are correct price signals. Others are that consumers need information available to make intelligent choices.

These market functions do not always work well and they plague the energy business in particular. One example: Nearly half of all major appliances bought every year in America are bought by somebody who will never pay the utility bill: a home builder or a landlord. They buy the appliance, somebody else pays the bill. They have no incentive to buy an efficient piece of equipment.

That is where the Federal Government comes in and that is where these DOE and EPA programs that you have heard testimony about have effect. They are trying to improve the marketplace, they are trying to reduce the market barriers, and give con-

sumers the information, the know-how, to make intelligent and rational decisions.

You asked, Chairman McIntosh, as did Senator Nickles, in your opening statement what are the value of these programs before you today. I would say quite a lot. You have heard earlier testimony from GAO and DOE. Please take a look at a 1996 GAO audit of DOE successes. It showed, and I think Congressman Kucinich talked about it, that, quite simply, just five technologies, five of the many technologies that DOE helped put in the marketplace, saved consumers and companies \$28 billion just through 1994.

All these programs cost about—all the DOE efficiency programs—cost about \$8 billion in aggregate. Just five technologies alone saved \$28 billion. If you add all the other technologies GAO did not look at and the subsequent years, the number is quite enormous.

Let me also say something, and we can see a chart. I hope you can see it from there. It has to do with the role of energy efficiency in the economy and the success we have had. It has been striking. We did a recent analysis and we wanted to compare energy efficiency to the more traditional sources. So we did a model of what the economy would look like if we had not had the energy efficiency gains that American engineering know-how has brought us since 1973.

We found something that—I have been doing this for 22 years—I found startling. Energy efficiency is now our No. 2 energy source in this country. It does not produce as much energy as petroleum—and you can see I have split the petroleum there; the bottom is domestic and the top is imported. It does not supply as much energy as does petroleum. It supplies more than natural gas, more than coal, more than nuclear, more than hydro.

It really is No. 2, and it is 100 percent domestically produced, unlike oil. It has been very successful.

The DOE programs and the EPA programs are part of that. They are not the total part certainly, but they are a key part of the success. That is why I think these programs deserve your support. I think regardless of your views on Kyoto that you literally will have no regrets in supporting the wise use of energy.

Thank you again for the opportunity to testify before you, and I thank you for your oversight on these programs and look forward to working with you.

[The prepared statement of Mr. Nemptzow follows:]

PREPARED STATEMENT OF DAVID NEMTZOW, PRESIDENT, ALLIANCE TO SAVE ENERGY

Mr. Chairman and members of the subcommittee, thank you for the opportunity to testify before you today regarding the White House Climate Change Technology Initiative (CCTI) and its efforts to improve energy-efficiency with the goal of addressing global climate change.

My name is David Nemptzow. I am President of the Alliance to Save Energy, a bipartisan, non-profit coalition of business, government, environmental, and consumer leaders dedicated to improving the efficiency with which our economy uses energy. Senators Charles Percy and Hubert Humphrey founded the Alliance in 1977; it is currently chaired by Senators Jeff Bingaman and James Jeffords as well as Representatives John Porter and Ed Markey.

Seventy companies and organizations currently belong to the Alliance to Save Energy. If it pleases the Chairman I would like to include for the record a complete list of the Alliance's Board of Directors and Associate members, which includes the

nation's leading energy efficiency firms, electric and gas utilities, and other companies providing cost savings and pollution reduction to the marketplace.

The Alliance has a long history of researching and evaluating federal energy efficiency efforts. We also have a long history of supporting and participating in efforts to promote energy efficiency that rely not on mandatory federal regulations, but on partnerships between government and business and between the federal and State governments. Federal energy-efficiency programs at the Department of Energy (DOE), the Environmental Protection Agency (EPA), and other agencies are largely voluntary programs that further the national goals of broad-based economic growth, environmental protection, national security and economic competitiveness.

I. INTRODUCTION

Energy-efficiency: a bipartisan tradition

From the days of our first national nightmare of gas lines and soaring fuel prices, energy-efficiency has had champions in Congress from both sides of the aisle. Sen. Charles Percy, who founded the Alliance to Save Energy in 1977, recognized the need to promote energy-efficiency to address a glaring hole in our nation's economic security. He recruited Sen. Hubert Humphrey for this endeavor in the final days of his life to demonstrate that the need to pursue greater energy-efficiency in the economy obliterated party lines. In addition, he knew that a partnership between business, government, environmentalists, and consumer advocates would not only result in benefits for each sector, it would help avoid the need for coercive regulation when our problems reach crisis level.

That maxim is no less true today, even though oil supplies and prices have eased. Our fossil fuel economy is now believed by many to have put new stresses on our environment. Energy-efficiency has been repeatedly cited as a key solution to slow the loading of carbon and other greenhouse gases into the atmosphere. Fortunately, we now have a quarter-century track record of showing how energy-efficiency reduces emissions of criteria air pollutants as well as carbon.

Support of action by the federal government to promote energy-efficiency has also been historically bipartisan. Though the establishment of the Department of Energy and energy-efficiency programs is most often associated with the Carter Administration, key advancements in federal efforts were made under the Reagan and Bush Administrations. While funding was cut severely from Carter-era levels, President Ronald Reagan signed the National Appliance Efficiency and Conservation Act (NAECA) the law requiring DOE to set energy-efficiency standards for appliances and other equipment. That program has led to tens of billions of dollars in savings for the American people and significant carbon emissions reductions. The Bush Administration, in the context of its support for the Rio Treaty, began to significantly expand funding for DOE energy-efficiency and renewable energy efforts and created the Green Lights and Energy Star programs at EPA. In addition, President Bush signed the Energy Policy Act of 1992, which expanded the scope and magnitude of energy-efficiency efforts.

The House and Senate caucuses devoted to promoting renewable energy and energy-efficiency continue that tradition of bipartisanship. Currently, the House Renewable Energy Caucus features 65 Republicans and 84 Democrats, while the newer Senate version counts 10 Republicans and 14 Democrats. Such support from all parts of the political spectrum is what has made clean energy a driving force in the American economy.

Today's testimony

I am here today, Mr. Chairman, to respond to committee concerns about the Clinton Administration's Climate Change Technology Initiative (CCTI), and to comment on its request for additional funding for energy-efficiency programs. Mr. Chairman, I'm not even going to attempt to sit here and discuss the details of sub-programs in the Partnership for a New Generation of Vehicles or weigh the relative accomplishments of the pulp and paper effort of Industries of the Future. I believe my job is to help keep our eye on the big picture, and try to give context for federal energy-efficiency efforts looking into the 21st century. We need to know where we've come from in order to understand where we are going. Finally, Mr. Chairman, I will make a case for why enhanced federal energy-efficiency efforts are crucial to the nation's future irrespective of climate change, and why the Administration has correctly built its climate change strategy around energy-efficiency.

II. ENERGY-EFFICIENCY AND CLIMATE CHANGE

Climate change and the Alliance to Save Energy

Let me start, Mr. Chairman, by stating that the Alliance to Save Energy currently has no official policy on climate change. We are not on record regarding targets or timetables, the Kyoto treaty, nor any other proposed form of regulation to address the problem. However, we are very cognizant of both the science and politics surrounding the issue, and even more acutely, the potential for energy-efficiency to be a large part of the solution to global climate change.

Frankly, Mr. Chairman, the Alliance is not surprised that energy-efficiency stands to be a key component of nearly any climate change strategy. And slowing or stemming climate change should rightly take its place with economic growth, reduction of other environmental pollutants, increased national security, and promoting American competitiveness abroad, as a reason to move full speed ahead with research, development, and deployment of energy-efficient technology throughout the economy. We are such believers in the positive effects of energy-efficiency that if you told us it cured the common cold, we might not be surprised.

However, energy-efficiency becomes an even more crucial component for our nation's near-term future when we think of the fact that a huge amount of our nation's capital stock will turn over in the next 10 years. EPA estimates that fully 60 percent of our carbon emissions in 2010 will come from equipment not yet purchased. Decisions about how we develop and deploy technology will have a profound effect on whether the nation is even able to sufficiently reduce emissions if a political consensus on action to stem climate change should develop. In this context, energy-efficiency becomes an insurance policy that the nation can ill-afford to pass up, and one that should be pursued with no regret.

III. FEDERAL ENERGY-EFFICIENCY EFFORTS

Federal energy programs and climate change

As you know, Mr. Chairman, the vast majority of energy-efficiency programs in the federal government existed long before climate change became an added rationale for them. Through both the 1993 Climate Change Action Plan, and the 1998 Climate Change Technology Initiative, the Clinton Administration designated many existing programs as part of their climate change efforts. This designation did not substantially alter the basic thrust of the vast majority of energy-efficiency programs. Those programs remained focused on achieving substantially greater energy-efficiency in buildings, industrial processes and transportation, as well as in federal facilities, with the goal of lowering energy waste, oil imports, utility bills, and urban air pollution.

In fact, Mr. Chairman, many supporters of those programs questioned the political wisdom of that designation, considering what have been polarized attitudes surrounding the climate change issue in this decade. In spite of that heated debate, which rages even today, we must not lose sight of the non-climate benefits of the programs. Further, those societal economic, environmental, national security and international benefits must be factored into comparisons of various climate change mitigation strategies.

Energy-efficiency research, development, and deployment: why the Federal Government?

Back in 1995, when some in Congress were contemplating the dissolution of the Department of Energy, two major reports were released that came to the same conclusion: If we forego federal research and development in energy technologies, it will not be replaced in kind by the private sector. Both the Galvin Commission studying the national laboratories and DOE's Yergin Task Force looked at energy research and development and arrived at this conclusion. Among the reasons they cited as barriers to corporate efforts are high R&D costs, internal cost-cutting which has resulted in widespread downsizing of companies, uncertainty of property rights and the ability to capture all the benefits of R&D, and high initial investment in R&D capability.

In the early 1990's, Mr. Chairman federal energy research efforts were criticized for producing technology and innovation in a vacuum. While research accomplishments were substantial, many business leaders believed that these efforts were not relevant to markets for lighting, building materials, automobiles and other products. This decade has seen an exponential rise in cooperation, planning, and cost-sharing with the private sector to assure that federal research and deployment really do create the maximum value added. These process gains are exemplified by EPA's Green Lights and Energy Star as well as DOE's Industries of the Future and Buildings Roadmap programs.

Technology deployment is integral to a successful research agenda

Some critics of DOE and EPA energy-efficiency efforts have argued that while basic research is an acceptable activity of the federal government, deployment and market transformation are not.

The need for having deployment in the toolbox of DOE is illustrated by the story of the flame retention oil burner. DOE did not develop this technology. However, in response to the oil price shocks of the 1970s, DOE worked with the oil heat industry to field test and promote the technology as a substantial energy-saver. The key was a program to train fuel oil technicians how to install these advanced burners to yield the most savings for homeowners.

The subsequent realization by the oil heat industry of its attributes created demand, and adoption of the flame retention head oil burner increased about ten-fold between 1979 and 1983. As of 1996, the technology was in use in about 7.3 million households, over half of oil-heated homes. The burner provides an 11-22 percent energy saving, Mr. Chairman, and a conservative energy savings estimate of nearly \$7 billion for consumers from a simple, existing technology—in large part due to deployment efforts by DOE. DOE's responsibility for this benefit can be traced to addressing barriers that were inhibiting wide use of the technology, and accelerating market penetration.

Federal programs: have they returned our investment?

In 1996, Mr. Chairman, the General Accounting Office did a study of a variety of success stories which DOE had published in 1994. Unfortunately, the purpose of the study appeared to be political, and it attempted to discredit energy efficiency programs by attacking DOE's methodology for preparing the success stories. But rather than achieving this goal, it ended up validating billions in energy savings for a few key technologies which far outstrip out entire national investment in energy efficiency over the past 20 years.

Mr. Chairman, the accumulated success of these programs at saving money for American consumers and taxpayers is remarkable. The GAO study validated DOE's assertion that just five technologies* developed or assisted by the DOE buildings program resulted in \$28 billion in energy savings over the past 20 years for an approximate \$8 billion in investment as of 1994. Add FEMP gains and it moves to \$40 billion. Add the effect of appliance improvements under NAECA and that figure is multiplied. Add the hundreds of other technologies to come out of the business, industrial, and transportation programs and the additional accrued energy savings of the past 5 years and you get a portrait of an overwhelmingly cost-effective effort which has contributed significantly and directly to the quality of life of Americans.

By the same token, the EPA Energy Star and Green Lights programs, as well as other EPA climate programs, have already returned \$6.5 billion to the economy from an approximate one-half billion dollar investment.

It must be noted, Mr. Chairman, that these dollar returns are from just lower fuel and energy bills—they do not include the economic value of reductions in pollution, increases in productivity and comfort of employees and consumers, or national security benefits of oil imports.

A more comprehensive audit must be performed

Mr. Chairman, I believe we need an even more comprehensive review of the accomplishments of energy-efficiency programs in the federal government that spans the work of DOE, EPA, the Agency for International Development, and other agencies. Until we get a clearer picture of the size and scope of the accomplishment of federal energy-efficiency efforts, we cannot fully assess their value in a climate change context.

IV. OTHER FEDERAL OPPORTUNITIES FOR INCREASING ENERGY-EFFICIENCY

Tax credits

The Alliance strongly supports efforts by Rep. Bill Thomas, the Clinton Administration, and others to propose tax credits as an addition to the mix of policy options for saving energy—and thus reducing carbon emissions. Whereas tax credits in the late 1970s and early 1980s were poorly targeted and difficult to verify, we now have the knowledge and ability to construct tax credits that both seed high technology and push markets toward more energy-efficient behavior.

Again, Mr. Chairman, the push for energy tax credits is bipartisan. H.R. 1358, the Energy Efficient and Affordable Homes Act of 1999, sponsored by Rep. Bill

*The technologies are: low-emissivity windows, electronic ballasts, advanced refrigerator compressors, the flame retention head oil burner, and DOE-II building design software.

Thomas, which would provide tax credits for both the construction of highly efficient homes and the substantial upgrade of existing housing. The bill has significant potential to actively engage homebuilders in energy-efficient building practices and encourage homeowners to tackle the lion's share of energy use in existing homes.

V. ENERGY-EFFICIENCY AND THE ECONOMY

Energy efficiency makes money and puts people to work. The economic gains from energy efficiency come in two forms. The greatest benefit comes from displaced costs—money that households and businesses can spend elsewhere because they no longer have to spend it on energy. That spending includes additional investment and hiring additional workers. Direct economic benefits come from growth in industries that generate energy-efficient products and services. Companies that sell insulation or efficient windows domestically and/or for export employ Americans in high-skill service and manufacturing jobs. Secondary economic benefits come from businesses and consumers re-spending these newfound energy savings in sectors of the economy which are more labor-intensive than energy supply.

Energy-efficiency must be measured as an energy source

The White House Climate Change Technology Initiative operates against the backdrop of a U.S. economy that has become significantly more energy-efficient over the past quarter-century. But we often fail to realize the actual contribution of energy efficiency to our GDP and national well being.

Mr. Chairman, it isn't easy to compare the contribution of energy-efficiency to the environment and the economy with more traditional energy sources such as oil and coal. It requires the observer to regard saved or unused energy as created energy in the same way that oil comes out of the well and coal comes out of the mine. In addition, I think that any economist would tell you that energy-efficiency measures have increased the supply of energy and thus helped to lower the price. Energy not used is just as salable and usable when conserved as when produced. Upgrades in energy-efficiency made to home appliances, industrial equipment, building systems, or car and truck fleets serve as an energy source that increases our overall supply of electricity, coal, oil, and natural gas.

Energy-efficiency, our number 2 energy source in 1977

Alliance research shows that, for 1997, the most recent year for which we have complete data, energy-efficiency was the second leading source of energy for U.S. consumption, and if we consider only domestic energy sources, it's number one. Mr. Chairman, it would have been number-one if we declined to count oil imports, now more than half of this nation's oil consumption. Our analysis of 1997 energy consumption shows that energy efficiency provided the nation with 29.5 quadrillion Btus (quads), approximately 25 percent of U.S. energy consumption. While energy-efficiency trails our mammoth oil consumption (36.3 quads), it significantly outstrips the contribution of natural gas (22.5 quads), coal (21.0 quads), nuclear (6.7 quads) and hydro (3.8 quads).

Mr. Chairman, the contribution of energy-efficiency to our nation's overall supply is now so great that we cannot regard as an esoteric externality anymore. We must promote and support it in the same way we do the coal belt and the oil patch, which enjoy a variety of tax breaks and subsidies based on their use of fuel.

These figures show energy-efficiency for what it is—an unparalleled driver of environmentally sound economic growth.

Mr. Chairman, these economic snapshots of efficiency show an energy industry that spans the economy and the populace. But it is not an energy industry that looks like what we have known in the past. However, all the functions of traditional energy industries are represented. But with energy-efficiency, the miners are businesses trying to cut their costs. The roughnecks are homeowners trying to keep their families warmer in the winter. The geologists are mechanical engineers working to get more out of less. Energy-efficiency is highly dispersed throughout the economy. And because of its diffuse nature, energy-efficiency doesn't carry the political clout of the coal-mining regions, or of the oil and gas-producing regions. There is no "energy-efficiency patch."

By the same token there is not a defined energy-efficiency industry. Whirlpool makes highly efficient appliances but they sell washing machines and refrigerators, not energy efficiency. Honeywell sells controls that regulate building systems that can save a company millions of dollars a year, not energy efficiency. Owens-Corning sells fiberglass insulation which can make a house warmer, more comfortable, and more economical to live in, but they sell insulation, not energy-efficiency.

So when we have to make tough choices about what we do with federal dollars, we must think about energy-efficiency as what it is—an energy source that is essen-

tial for the economic health of our nation—and one that is paying off like a gusher for the American people. And yes, Mr. Chairman, that energy is produced cleanly, displacing both conventional air pollutants as well as ones believed by many to be causing a warming of the Earth's climate. It enhances our national security, as this year we again went to war to protect our interests in Mideast oil fields. Energy-efficiency cuts costs for businesses and consumers, and it increases our international competitiveness—all the things we have traditionally talked about.

The tough choices on energy and climate must be made with a clear eye on the contribution to the environment, the economy, national security, and international competitiveness delivered in the past and promised for the future by energy-efficiency.

VI. NON-CLIMATE BENEFITS OF ENERGY EFFICIENCY

Environmental health

Regardless of climate change, the most polluting activity on earth is the production, transportation, and use of energy. Electricity generation, vehicle exhaust, oil spills, the heating and cooling of buildings, industrial processes, and myriad other uses of energy account for what is estimated to be 80-90 percent of environmental pollution in this country. As our population and economic activity increases into the 21st Century, environmental stresses on our air, water, and land will be heightened.

Alliance research shows that the gains made in energy-efficiency alone during the past 25 years have resulted in 18 percent less air pollution. This massive assistance to our environmental health is in addition to improvements made through the Clean Air Act and other air regulations.

National security

As historians consider the reasons for the Persian Gulf War, one must acknowledge that the U.S. went to war with Iraq in 1991 in large part to defend our critical oil interests in the region. Within the past year, we have again gone to war with Iraq to protect those same interests. When considered by economists, the billions which American taxpayers spent to protect those interests—never mind the dangers posed to a half a million American soldiers—should be added not onto our military or diplomatic budget, but onto our national expenditure for energy.

The U.S. has now crossed the line of being dependent for more than half of its oil consumption on foreign sources. Two-thirds of that habit comes from transportation. Without more aggressive research and innovation in automobile technology that situation will grow significantly worse in the coming decades for two reasons. One, U.S. consumption will continue to grow both in the number of vehicles on the road and the amount driven by each one. Two, the concentration of remaining global oil reserves will grow more consolidated in the Persian Gulf region as time goes on, making the U.S. more and more beholden to a region which demonstrates its volatility nearly every day. Consequently, U.S. dependence on foreign oil is projected to rise to nearly 60 percent within 10 years.

In the absence of Congressional support for increasing Corporate Average Fuel Economy Standards (CAFE), the Partnership for a New Generation of Vehicles remains our best bet for the development of cleaner, more fuel-efficient cars with which to reduce our dependence on foreign oil supplies. This program has come under some criticism, and perhaps it is valid to question why the Big Three automakers require millions of dollars in federal research to develop products that are less environmentally harmful. However, cleaner, more efficient cars remain a national priority, and PNGV is making progress. While much of the advancement made thus far through the program has been kept proprietary, the known advances in fuel cells and hybrids are getting us closer to clean cars. In fact, Mr. Chairman, the fact that this information is being kept proprietary is a good sign that progress is being made and that people are expecting money to be made in the future.

GLOBAL ECONOMIC DEVELOPMENT AND COMPETITION

Mr. Chairman, the Byrd-Hagel Resolution cites as a chief concern the contribution of developing countries to emissions reductions. For all of the signers of that resolution and all others concerned with the future of global carbon emissions, the infrastructure development occurring in developing nations should be of the utmost importance. Whether nations develop their commercial and industrial systems with energy-efficient technology or cheap, inefficient equipment will again affect not only whether the world addresses climate change, but whether it will even have the power to.

Burgeoning economic development throughout the world presents massive opportunities for American business to parlay its technological leadership into economic

gain. Whether one puts a higher value on environmental protection or the economic value of American exports, the United States should be the technical leader in cost-efficient energy technology, and we should be the ones to sell it to the world.

The potential for the global market for energy efficiency products and services over the next 10-15 years has been estimated at \$84 billion. All Americans want to see the fulfillment of a large part of that market potential come back as U.S. jobs and revenue. However, U.S. exporters face strong competition from a variety of nations in energy technologies, many of which give aggressive R&D and international marketing assistance to native businesses. For example, as of 1996, the U.S. government now spent less on research and development than the Japanese government—not less per capita, less outright.

Mr. Chairman, now is not the time to back away from technological investment that can significantly contribute to our nation's future economic growth and ability to compete in international markets. In addition, as global environmental concerns become more and more key to our own quality of life, we must staunchly defend the technological leadership we now hold and be able to provide environmentally sound technologies to the developing world.

VII. INVESTMENT ENERGY-EFFICIENCY: NOTHING TO LOSE AND EVERYTHING TO GAIN

Mr. Chairman, I have described here how energy efficiency has been a transforming force in the American economy, and how federal energy efficiency efforts have played a key role in that expansion. Investments in research, development, and deployment of energy-efficient technology pay for themselves many times over in economic, environmental, and national security benefits. In addition, these are strides forward that would happen much more slowly or even not at all without federal leadership.

Any evaluation of climate change programs must fully factor in the benefits of energy-efficiency gains in any cost-benefit analysis. In order to do that, we must undertake a more comprehensive accounting of the benefits of federal energy-efficiency programs that began 25 years ago, and have continued through today.

Mr. Chairman, I believe that energy-efficiency efforts at DOE, EPA and other agencies should be escalated with or without their inclusion in a climate change program, and the Alliance strongly supports the President's fiscal year 2000 budget request for these programs. I have yet to learn of a federal investment that has yielded such rich rewards so broadly dispersed over the economy.

That being said, if we believe that climate change is a threat to our environment and economy, we can find no better insurance policy for dealing with that problem in the future than to make every effort to improve the energy-efficiency of our transportation, our industrial technology, and our homes and offices. To attack these programs, or to walk away from federal leadership on the issue is to shrug our shoulders and say that—in the absence of scientific or political consensus on climate change—the global environment we leave to our children is not worth the relatively modest expenditure that has been asked for by the President.

Thank you for the opportunity to testify before your committees today. I'm happy to address any questions you might have.

Representative MCINTOSH. Thank you, Mr. Nemptzow.

Let me turn now to my colleague Senator Craig if he has any questions for this panel.

Senator CRAIG. Possibly one for our last speaker, Mr. Chairman. I am struggling with your name again. "NEM-shaw"?

Mr. NEMTZOW. Good enough.

Senator CRAIG. Close enough, thank you. I do not like mispronouncing names.

Mr. NEMTZOW. I appreciate it.

Senator CRAIG. They are important to all of us.

I think all of us are tremendously interested in energy efficiencies. We simply know that if we can use what we have more wisely and more effectively, therefore more efficiently, that we get certain benefits.

At the same time, I find it very frustrating when we have administrations that will not come to Congress openly, honestly, and say, here are our programs and here are the reasons for these programs

and here are the values, and engage us in right and reasonable debate as to the justifications of them and why we ought to fund them, instead of playing what I just find unbelievable games at this moment.

That is part of the reason we are here today. We are having to step down firmly in this area simply because we cannot get good answers.

You heard two folks testify just now who I think rightfully and legitimately say this is some kind of fascinating game, because Congress by your own admission and by our presence has constantly participated in advancing energy efficiency by program and by project, but we do it responsibly for public policy purposes. We do not play the politics of it.

That does not mean there are not politics involved at the time in shaping it, but that is the way public policy gets framed.

I am terribly frustrated when we look at a chart like this and we see the absence of performance goals—and I am talking efficiencies now. You know you get efficiencies in spending money, too. Sometimes you get more for your money if you advance a technology or improve a technology versus going off and searching for something that does not yield much or does not have the potential of yielding much.

If you were to take the last two, nuclear and hydro, they are not politically popular today for some reason. Yet, they are very clean and tremendously efficient, and therefore quality research in those areas to improve their productivity and even their environmental consequences seems to me to make a great deal of sense.

We know that to keep the blend in our market basket of energy, if you will, to keep our ambient air where we want it in attainable areas, that we have got to not only keep this, but improve it. The only way we will improve, and most scientists will say it, based on the energy needs we have, even striving for efficiencies always and therefore being able to use some of those in a growing energy base, we are going to have to have more nuclear.

Few would argue differently than that, at least scientists who really look at the total picture. And yet this administration spends zero dollars as a whole. I mean, you talk about the efficiency of expenditure. They are spending nothing in the area of new reactor design to speak of. Oh, they have gotten busy and tossed a little money out. But as it relates to the percentage of the whole market basket, very, very little.

Reaction? Is that a very efficient way to spend the taxpayers' money in search of efficiencies in energy production?

Mr. NEMTZOW. You ask a very important question and very articulately, so let me try to respond. You asked several questions and I would like to respond to your last one and respond to your others.

I think if I could say about an earlier point, and I say it deliberately to a Senator from the Pacific Northwest, the line about not missing the forest for the trees. I think as you conduct your oversight and what you heard from GAO, I think it is very important for you to ask the kinds of questions you asked to get at these kinds of results, but again to step back and look at the forest of these programs.

Have they produced all the paperwork? I think you made a pretty clear case they have not. But have these programs produced results for the American consumer and for the American environment? I think the answer is quite clearly yes. Not that they cannot be improved, but the record has been good and it deserves your support.

So I hope you will take both these perspectives as you continue your work.

Representative MCINTOSH. Mr. Nemptzow, and if the gentleman would yield?

Senator CRAIG. Sure.

Representative MCINTOSH. To just follow up on your point there, specifically about nuclear energy, the measures that we do have indicate that for a very small percentage of the total cost, about \$5 million out of a \$4 billion program, the nuclear component delivers about a quarter of the carbon reduction.

So one of the values of these measures is also to compare different programs and see where, assuming there is benefit, where you get the most benefit for the dollar spent.

Mr. NEMTZOW. That is right, and I think that is the response to I think the more fundamental question you ask, Senator, about what I will characterize as: Where is the energy policy? You asked it differently, but that is how I heard it, in terms of nuclear, in terms of natural gas, in terms of efficiency. This really is what an economist calls a problem in multiple variables: reducing climate change, reducing costs to consumers, improving our competitiveness, ambient air standards, high technology for our Nation's future.

There are many goals here—domestic resources. Nuclear is part of that, natural gas is, coal, certainly efficiency and renewables, especially as we look forward.

So the Alliance to Save Energy supports the efficient use of all energy sources. And let me be clear—that is where we stand and we do not take sides on one fuel or another. But more importantly is, I hope you will pursue this line of questions to other witnesses about where is the energy policy and can they deliver numbers.

The question to the nuclear industry, of course, is can you deliver on Wall Street, and that is the challenge they are facing right now. To others it is can you deliver wherever, to other audiences.

Senator CRAIG. Well, you are right to ask the question—you ask that the question be asked. Every Secretary of Energy that I have participated in confirming, that has sat at that table before this committee, we have questioned them about the need for policy, the need for an energy program for this country, and they have all promised it, and none have delivered.

It is not currently in DOE's nature to work with Congress for the purpose of our shaping and articulating an energy program that makes sense on this issue so that all the pieces fit together. I have grown not to expect that. I have had to grow to rely on the marketplace with a few initiatives around the edge. That seems to be the greater policy in our environment today. That does not mean it should not be but when it comes to where we place resources in relation to a policy, it is not existent.

That is why we are trying to struggle through measurements, trying to assess where we are and how valuable these programs are or are not, and therefore where should we place the dollar priority, because we are finally, and thank goodness, moving into an environment of limited resources when it comes to budgets. So it is even more important that we have those measurements.

So you and your folks can be very helpful in offering some of that advice.

Mr. Chairman, thank you.

Representative MCINTOSH. Thank you very much, Senator Craig, and thank you for your participation today and continued oversight in these areas.

I have got two quick questions. The first is for Professor Lash. Would you comment on Mr. Glauthier's and some of the other administration's witnesses' emphasis on "solely for Kyoto," that language in the report, and how that affects the interpretation that you suggested earlier in your testimony?

Mr. LASH. Mr. Chairman, I think the administration's witnesses were being a little less than forthcoming. I will put it kindly. They were playing a lot of word games. As long as we do not say the words, OK, we are doing this solely for the Kyoto Protocol, we can do it. If we can hitch our star to any other agenda, we can pull it off. So they, by going for this restriction and simply looking for the "solely"—and they are not going to be that stupid; this is not amateur night—they give themselves wide running room.

But they ignore the spirit of the Knollenberg amendment, and again it is time to get tough with them.

Representative MCINTOSH. So a more appropriate interpretation of the amendment, as Mr. Knollenberg testified at the beginning of this hearing, would be that there is a zone of actions the agency could take that are not mandated by law, but within their discretion, that would be prohibited because the effect is to move forward the implementation of Kyoto?

Mr. LASH. You are absolutely right. For example, the credit for voluntary reductions, that is not a mandated action, it is clearly discretionary. Yet, as we heard from I think Mr. Fitzgerald, I believe, was the counsel for GAO, he says, well, as I interpret this you did not say programs or policies, and it is voluntary, we are not spending any money.

Well, I think, frankly, if you have one secretary make one photocopy you have spent some money in furtherance of the Kyoto Protocol, as I read the Knollenberg amendment.

Representative MCINTOSH. Let me ask you this. Suppose there were a regulation of carbon dioxide emissions that clearly is not required to be issued under the Clean Air Act or we would have seen it a long time ago, but it is something that the agency as it moves forward in implementing that act has legal discretion to do. Would that be the type of action that would be covered by the Knollenberg amendment?

Mr. LASH. Absolutely. If you look at how the attempts to regulate CO₂ have evolved, this body has asked the EPA numerous times, do you have the ability to regulate CO₂? And then we get an answer from EPA, Administrator Browner, saying, well, I am not sure. Then we get this memo from counsel saying, yes, we do.

In the Clean Air Act, I think the amendments from 1990, never was CO₂ listed, so it was clearly a question of discretionary action, and how they decided to include CO₂ monitoring as part of a settlement agreement of an old lawsuit from 1994 regarding mercury emissions just frankly boggles my mind. I could follow their reasoning, but if this was a law school exam someone needs to take this course over again.

Representative MCINTOSH. Thank you.

The final question I have got is for Mr. Taylor. Would you address this question of market barriers that Mr. Nemptzow had mentioned in his testimony for the various technologies to achieve energy efficiency? Is that something that is in fact out there in the world?

Mr. TAYLOR. Most economists who have looked at this acknowledge that there are market barriers to virtually any activity one could dream up. That does not necessarily mean that the markets are operating inefficiently. For example, none of us are omnipotent, thus we do not have all the information in a perfect world that we would use, in a world of optimality.

So there is a market barrier, information. Does that necessarily mean markets need to be intervened in by government? Not necessarily at all. There is a difference between market barriers and market failures. Mr. Nemptzow in his testimony I think confused the two.

A classic example of this is, let us go back to the heat pump. The Department of Energy and a number of different advocates believe that it is only because of consumer failure, somehow they just do not know enough or that they are not investing wisely or they just do not have enough money to spend, that prevents them from buying that really efficient electric heat pump, which costs about \$5,500 compared to the standard heat pump on the market which is about \$4,400.

Now, conveniently enough, the administration's CCTI program would provide a 20 percent credit and actually the difference in cost, about \$1,100, would be paid for by that credit. Now, of course they would then calculate and say, well, how much energy is saved? Well, we know how much energy is saved. We know it will be about 1,676 kilowatts per year on average, because the DOE tells us so.

Now, if we assume a 10 percent discount rate, an electricity price of about 8.3 cents per kilowatt hour, we find—and an 11-year operating life for that heat pump—we will find out that the consumer will save a total of \$783 in energy costs over the lifetime of that product.

So was it a consumer failure not to spend \$1,100 to save \$783? No, it is the consumer acting far more smart than this administration or a number of energy advocates who want to jam investments like that down our throats. So this is a small example of something you can find littered throughout these sorts of claims about market barriers.

What you usually find is that energy efficiency investments are very expensive, particularly up front. There are certain light bulbs that cost \$40 that are pretty darn efficient, but if I have \$40 to invest it is probably going into a mutual fund and it is probably

going to pay off better in the long run. Those are the sorts of problems that energy efficiency investments have to overcome, and the fact that market participants do not jump those hurdles themselves is a compliment to the market agents in question, not an indictment of them.

Mr. NEMTZOW. Mr. Chairman, may I respond, having been accused of being confused, which I am not.

Representative MCINTOSH. Certainly, Mr. Nemptzow.

Mr. NEMTZOW. What Mr. Taylor is failing to note is that there are different types of barriers and different types of failures. He is correct, information alone is not the only barrier. There are many other barriers to that. I gave the example earlier, half of refrigerators are bought by landlords or developers. They are intelligent people. They are not paying the utility bill. They want a cheap refrigerator. The bill may be high. The consumer pays for that and society pays for that in the form of air pollutants, in the form of imported oil, and in the form of all the other ancillary issues that are not in the price, so that even a rational, informed consumer does not see that price signal.

It is important to remember that. And I would say, at Price Club, compact fluorescent light bulbs, \$10. They are not \$40. They are \$10, and they will save you \$18 a year if you live in the local area.

Mr. TAYLOR. I was referring to different light bulbs, Mr. Nemptzow.

Representative MCINTOSH. Let me ask you, Mr. Nemptzow. Would you not expect if there were differences like that, certain home builders or landlords would advertise and market their products based on the savings: Buy my house or rent my unit and your utility bills will be lower? Every time my wife and I have bought a house, we have asked to look at the utility bills from the previous occupant to get a gauge of what that will be in our yearly income along with the mortgage payment and everything else that goes with buying that house.

So it strikes me that maybe the market in fact does take care of that in an indirect way.

Mr. NEMTZOW. It needs to, but it needs to have the information. Right now, if you buy a car, there is a label in the back right window that shows the fuel economy. You buy an appliance, there is a yellow label. Buy a house, there is no label. You need to do some homework. You really need to know what you are doing. EPA has now started one of these programs, it is called Energy Star Homes, a label on a home so you know it is efficient.

You are a co-sponsor of H.R. 1358, Congressman Bill Thomas's bill to provide a \$2,000 tax credit for energy efficient homes. I want to thank you for that and I also want to say that that is right on the mark, because by providing that kind of tax credit you are doing two things. You are lowering that first price and you are educating the consumer. As we like to say, we are making H&R Block the information source to help educate consumers that these homes will save you on your bills, maybe you will even get a tax credit on it.

But you are absolutely right, you need to know what you are doing and you need to have that information in a way that consumers can use.

Representative MCINTOSH. Not necessarily the ultimate consumer. Your intermediary may be able to gather that information and then pass it on in the form of advertising his homes as being more energy efficient.

Mr. NEMTZOW. That is right, and some of the Energy Star builders are doing just that. Each company does it differently. Whirlpool uses it to advertise their products: higher quality, more efficient. Each company is different. Many are doing that. You are absolutely right, they are using the marketplace.

Representative MCINTOSH. I have no further questions. Senator Craig, did you have any?

Senator CRAIG. I do not. I thank you all very much for your testimony. It has been very enlightening.

Representative MCINTOSH. I do indeed, and thank you all. We are holding the record open for 2 weeks. If something that has been presented earlier we would like to run by you as the economic and legal experts, the staff may ask you to submit some additional responses.

So thank you all. With that, the committees stand in adjournment.

[Whereupon, at 5:27 p.m., the hearing was adjourned.]

APPENDIX
RESPONSES TO ADDITIONAL QUESTIONS

CONGRESS OF THE UNITED STATES,
Washington, DC, May 27, 1999.

Hon. T.J. GLAUTHIER,
Deputy Secretary of Energy, Department of Energy, Washington, DC.

DEAR DEPUTY SECRETARY GLAUTHIER: Thank you for testifying at the joint hearing on May 20, 1999, entitled "Global Climate Change: The Administration's Compliance with Recent Statutory Requirements," before the Senate Subcommittee on Energy Research, Development, Production and Regulation and the House Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs. During the hearing, you agreed to respond promptly to followup questions.

Please provide the information requested in this letter not later than June 18, 1999 to the Senate Subcommittee staff in Room 308 Dirksen Senate Office Building and the House Subcommittee staff in Room B-377 Rayburn House Office Building. If you have any questions, please contact Counsel Colleen Deegan at 224-8115 or Professional Staff Member Barbara Kahlow at 226-3058.

Thank you in advance for your attention to this request.

Sincerely,

DON NICKLES,
*Chairman, Subcommittee on Energy
Research Development, Production
and Regulation.*

DAVID M. MCINTOSH,
*Chairman, Subcommittee on Na-
tional Economic Growth, Natural
Resources and Regulatory Affairs.*

DEPARTMENT OF ENERGY,
CONGRESSIONAL AND INTERGOVERNMENTAL AFFAIRS,
Washington, DC, July 15, 1999.

Hon. DON NICKLES,
*Chairman, Subcommittee on Energy Research, Development, Production and Regula-
tion, Committee on Energy and Natural Resources, U.S. Senate, Washington,
DC.*

and

Hon. DAVID M. MCINTOSH,
*Chairman, Subcommittee on National Economic Growth, Natural Resources and
Regulatory Affairs, Committee on Governmental Reform and Oversight, U.S.
House of Representatives, Washington, DC.*

DEAR MESSRS. CHAIRMEN: Enclosed are responses to the questions posed to Deputy Secretary T.J. Glauthier by your letter of May 27, 1999. These questions were a follow-up to his testimony before joint hearings of your subcommittees on the Administration's proposals under the Climate Change Technology Initiative. The enclosure includes responses to a number of questions posed by Senator Graham which were also conveyed by your letter.

If you have any questions regarding these responses, please contact Mark Mazur, Director of the Department's Office of Policy.

Sincerely,

JOHN C. ANGELL,
Assistant Secretary.

RESPONSES TO QUESTIONS FROM THE SUBCOMMITTEES

Question 1. In the House Subcommittee's review of the agencies' documents responsive to the House Subcommittee's March 1998 oversight letters to the agencies about the Administration's global climate change initiative, you, in your role as then OMB's Program Associate Director over all natural resource agencies, were revealed as a principal in the planning and decisionmaking process, especially regarding the level of funding for the various Administration initiatives. Since OMB produced only a fraction of the documents addressed to you or authored by you that were included in the agencies' documents, please describe the search you performed in response to the House Government Reform Committee's June 26, 1998 subpoena to OMB for all responsive documents.

Answer. In response to the June 26, 1998 subpoena to OMB, I did conduct a thorough review of all of my files and records related to the President's Climate Change Technology Initiative. I personally reviewed all of the information in my files, including: memoranda to and from my staff and other White House offices and agencies; emails to and from staff and other offices, meeting notes; draft reports, including those with any marginal notations by me, and any other documents that I had.

As a result of that review, I produced a set of materials which I turned over to the OMB General Counsel. Those materials generally did not include copies of memos or e-mails originating from others (including my staff, other White House offices, and other agencies) unless they had marginal notations from me. Also, when there were multiple drafts of the same report, I generally provided the most current version or draft. At the time, I did not understand that the incoming memos or e-mails and multiple drafts were to be produced. I understand that after my search, a search was conducted by OMB staff that included the incoming memos or e-mails, and multiple drafts.

Question 2a. Since the documents provided by OMB in response to the House subpoena revealed your active participation in the decision to increase the five-year spending request from +\$5.0 billion in October 1997 to +\$6.3 billion in February 1998, please indicate all of the principal White House complex officials involved with you in this decision and the rationale for the huge increase in requested funding after the December 1997 international meeting in Kyoto.

Answer. The decision to proceed with a higher budget request than originally projected, \$6.3 billion over 5 years versus \$5 billion, was made in the late Fall of 1997. The initial estimate would not normally have been announced publicly, since the analytical work was not complete on it at the time. However, it was considered important to cite a preliminary estimate in order to convey the relative magnitude and importance that the initiative would have.

The increase in the budget request resulted from the addition of funds from a Presidential reserve set-aside for initiatives, including increases to the tax incentive package, and technical re-estimates at the end of the process to the package of tax incentives.

The decisions on the final funding level of the initiative were made at two stages. First, the specific recommendations were made by the working group on the Climate Change Technology Initiative. The principal White House complex officials involved in that were Todd Stern in his role as White House coordinator for climate change issues, Katie McGinty and her staff at CEQ, Janet Yellen and her CEA staff, Jack Gibbons and his staff at OSTP, and me and my staff at OMB.

The second stage of decision-making was the overall approval of final budget levels, in the context of the final budgets for all programs and agencies. That process did include acknowledgment and approval of the final funding level for the climate change initiative by the Director of OMB, and then by the Chief of Staff to the President, and by the President himself.

Question 2b. Please describe Vice President Gore's involvement.

Answer. I do not recall any direct involvement by the Vice President or his staff in the decisions on the funding level of the climate change initiative, except as part of the usual overall budget review and approval process in the final stages of the FY 1999 Budget preparation.

Question 3a. Please explain why the President's April 1999 report to Congress does not include one or more program performance measures for each of DOE's 11 line item Budget accounts with climate change funding.

Answer. The White House Report to Congress includes overall program performance goals with target years (e.g. 80 mpg PNGV prototype in 2004) and FY 2000 performance measures for DOE's Energy Conservation, Solar and Renewable energy R&D, and Nuclear Energy programs included in the Climate Change Technology Initiative. Also, included in the report are performance goals for DOE's science activities conducted as part of the U.S. Global Change Research Program. The remain-

ing DOE programs have performance goals, but they were not included in the report.

Question 3b. When will these performance measures be available for Congress to consider in this year's appropriations process so that the American people can understand what results they would get for their tax dollars?

Answer. Every DOE program in the FY 2000 budget submitted to the Congress includes near term performance measures and longer term program goals related to energy, economic and environmental outcomes. All of which are included in the recent DOE FY 2000 budget report to Congress on the programs that concurrently support the President's Climate Change Technology Initiative.

Question 3c. When will 1990 baseline data be available for each of DOE's climate change performance measures?

Answer. The attached table reflects the 1990 baseline for energy consumption and carbon generation for the Office of Energy Efficiency and Renewable Energy programs.

Question 4. CEA Chair Janet Yellen estimates that the Kyoto Protocol, if flexibly implemented, would cost the U.S. no more than \$14 to \$23 for every ton of carbon reduced or avoided. We believe that Dr. Yellen's estimate provides a "performance goal" for evaluating the CCTI programs and funding requests. Every major CCTI program element should reduce carbon emissions for a cost less than \$14 to \$23 per ton. Otherwise, some CCTI proposals or initiatives would be more expensive, on a per ton basis, than the Kyoto Protocol itself. Such costly proposals or initiatives would fail what we propose to call "Janet Yellen Test."

Answer. The Department of Energy strongly disagrees with the concept that such a test is a valid indicator of program effectiveness. Program elements of CCTI should not be evaluated solely on the basis of the Federal cost per ton of the resulting emission reductions. Because all elements of the CCTI would produce multiple economic, environmental benefits and national security benefits, any assessment of their cost-effectiveness must include these other benefits, as well as any non-Federal costs involved. Only if all private and public costs are considered would the analysis be comparable to the Administration's assessment of the cost of emission permits under the Kyoto Protocol.

In evaluating the cost-effectiveness of the CCTI program elements, the highly variable impacts of different types of Federal programs should be explicitly considered. For example, regulatory programs usually require comparatively small Federal budget expenditures, but can involve significant private costs. Tax incentives directly contribute to private investment, where as information programs are designed to influence private investment decisions. The long term benefits of Federal support of research and development are especially difficult to assess but can be very large because the new technology that may result can have long lasting impacts on markets and economic competitiveness. Federal support for R&D is further justified by the many market barriers to private funding of such research, such as the difficulty private firms have in fully capturing the economic benefits of new technology, and the highly fragmented industries that dominate certain energy sectors, such as residential and commercial buildings.

Question 4a. In DOE's judgment, do all the major CCTI program elements pass the Yellen Test?

Answer. CCTI is a package of targeted tax incentives and investments aimed at increasing energy efficiency and spurring the broader use of renewable energy. The package will save consumers money, reduce emissions of greenhouse gases and air pollutants, and enhance national security.

Question 4b. Has DOE estimated the per ton cost of carbon reduced for each CCTI program by line item appropriation account? If not, why not?

Answer. No. For the reasons cited above, such as the multiple non-climate benefits that will result, we do not believe that the estimated Federal cost per ton of carbon reduced would be a particularly useful test of the cost-effectiveness of most CCTI programs.

Question 4c. Please provide estimates, by line item appropriation account, of the cost per ton of carbon reduced. If DOE is unable to make such estimates, please explain why?

Answer. Our budget justification, and supporting documentation, provides considerable information regarding the expected benefits, both monetary and other, of each element of the CCTI. In some cases, Federal or net economic costs per ton of carbon-equivalent emission reductions has been estimated. While it may be feasible to develop rough estimates of such costs for all elements of CCTI, this process would be time consuming and resource intensive, and, we believe, would not provide information that would substantially aid Congressional consideration of these proposed tax incentives and budget expenditures.

In most cases, the goal of climate-related R&D supported or proposed by the Department is to develop technologies capable of reducing greenhouse gas emissions at costs that are lower than competing technologies now in the marketplace, as well as producing other benefits.

For example, within the Fossil Energy (FE) R&D program, program goals include increasing the efficiency of new coal and natural gas electric power systems by approximately 50% (which directly reduces carbon emissions), while reducing costs, compared to current fossil energy technology options. This computes to a “negative” cost-effectiveness ratio. With respect to the FE carbon sequestration program, the program goal is sequestration at less than \$10 per ton of carbon sequestered. These technologies are targeted to be available for deployment by 2015. The reduction potential ranges from 100 million tons of per year (TPY) of carbon-equivalent emission in 2015, to 800 million TPY in 2050, for the U.S. The bulk of this reduction is attributable to sequestration, which would not be widely deployed without regulatory limits on carbon emissions. In addition to these programs, FE is also conducting research on cofiring biomass with coal at existing powerplants, and research on cheaper ways to identify and exploit natural gas deposits. The cost-effectiveness of these programs to reduce carbon emissions has not been calculated.

Question 4d. If DOE cannot provide such estimates, does DOE still believe that Congress has enough information to justify enactment of the proposed tax credits? If so, why?

Answer: Yes. The justification submitted with the FY 2000 budget and in follow-up materials already provided to the Congress address all of the critical benefits and costs that the Administration believes need to be considered. If more information is required on specific tax incentive or budget proposals, the Department and the other agencies involved stand ready to respond promptly.

Question 5. DOE’s Energy Information Administration (EIA) calculated a rough tax revenue loss for each ton of carbon reduced from the CCTI tax credits. Using a 7% discount rate, EIA found that the CCTI tax credit programs cost anywhere from \$28 to \$273 per ton of carbon reduced. For example, the buildings equipment tax credits would cost \$117 per ton of carbon reduced, the wind utility tax credit, \$218 per ton, and the buildings shell tax credits, \$273 per ton. Similarly, Jerry Taylor of the Cato Institute, in his testimony, estimated that the heat pump tax credit would cost \$666 per ton of carbon reduced. Those estimates suggest that all CCTI tax credit proposals fail the Yellen Test.

Question 5a. Does DOE agree with the cost per ton estimates provided by EIA and/or Mr. Taylor? If not, why not? What are DOE’s estimates of the cost per ton of the CCTI tax credits?

Answer. DOE does not agree with the cost per ton estimates provided by EIA.

In our judgment, because of numerous analytical shortcomings, the EIA study is not suitable for assessing the value of the CCTI tax credits. In fairness to EIA, numerous caveats in the report underscore the limited scope of its work, but the implications of these deficiencies need to be highlighted in this answer.

First, EIA’s modeling of the effect of the tax credits does not adequately consider the impact of a tax credit beyond reducing the capital cost for the affected products. Econometric analysis by the Lawrence Berkeley National Laboratory indicates that a tax credit helps remove barriers affecting the adoption of energy efficient products. For example, manufacturers and retailers will use the tax credits as a “hook” to get people to trade up to the more efficient models, and it will prompt them to change their markups in response to the increasing popularity of these efficient models. The credibility lent by the tax credit is not inconsequential, and there is an important “announcement effect” when a tax credit is proclaimed, according to LBNL’s analysis.

Second, EIA’s analysis does not adequately account for important synergies between the tax credits and CCTI’s funding for programs of research, development and deployment of energy efficiency and renewable energy technologies. Only a few of the mid-term and none of the long-term (post 2020) research and development programs were quantitatively evaluated by EIA, and for those programs that were evaluated, the results were not linked back to the analysis of the impact of the CCTI tax credits.

Third, the tax incentive analysis does not adequately address the market transformation related to the technologies included in the CCTI. The purpose of the tax credits is to “prime the pump” for these technologies—through increased sales to early adopters, greater market experience, higher production levels and greater awareness so that when the incentives expire, the technologies would be accepted into the marketplace.

Fourth, EIA’s analysis has limited applicability to the broader, multi-pronged approach developed by the Administration. Other mutually reinforcing policies in the

President's climate strategy include providing credits for early action; engaging in industry-by-industry consultations, managing Federal procurement and energy use to increase government energy efficiency, passing electricity restructuring legislation to reduce emissions and lower electricity bills, establishing future concentration goals; conducting bilateral dialogues; conducting periodic economic and science reviews; and changing federal procurement policy to increase renewable energy use. [In fairness to EIA, the request from the Congress for their impact analysis was limited to the CCTI and likely impacts of other elements of the Administration's climate proposals would be extremely difficult to assess quantitatively at this time.]

According to the Treasury Department, the CCTI tax incentives are estimated to reduce greenhouse gas emissions by 100 to 150 million metric tons of carbon equivalent over the lifetime of eligible purchases made through 2009. Those estimates of reductions in greenhouse gas emissions are likely to be understated. The benefits of the proposal should increase significantly in the years beyond the ten-year budget window, and those distant effects, by their very nature, are the most difficult to predict. The proposed incentives may also generate other benefits to society, such as reduced air pollution and vulnerability to oil supply disruptions. In addition, the proposals may produce private benefits, such as energy savings for consumers and businesses. The present value of energy savings for consumers and businesses over the lifetime of eligible items purchased through 2009 is estimated to be between \$22 billion and \$33 billion. The estimated revenue loss from the CCTI tax incentives is estimated to be \$3.6 billion from FY 2000-2004 and \$9.5 billion for FY 2000-2009.

Question 5b. Does DOE believe, in general, that voluntary programs, such as the proposed CCTI tax credits, should be less expensive than mandatory programs, such as those required for complete compliance with the Kyoto Protocol?

Answer. DOE believes that the government should not be encouraging (or requiring) private (or public) investments that result in net economic costs that are significantly higher than we anticipate will be required to meet U.S. obligations under current or prospective international agreements to curb greenhouse gas emissions. DOE believes that the CCTI proposals would achieve this objective.

Question 5c. Assuming for the sake of argument that EIA's analysis is correct and the CCTI tax credits would cost anywhere from \$28 to \$273 per ton in lost revenue, would DOE consider withdrawing its support for the proposed credits? If not, why not?

Answer. As indicated earlier, the estimated Federal revenue loss per ton of emissions reductions should not be the sole criterion for evaluating the desirability of the proposed tax incentives.

Please see the Treasury Department's analysis of the tax incentives (available on their website).

Question 6. DOE's EIA estimates that the CCTI tax credits for buildings, industry, and transportation would reduce primary U.S. energy consumption in 2010 only three-hundredths of one percent (0.03%). Similarly, EIA estimates that the tax credits for wind and solar power would reduce carbon emissions in 2010 by less than two-tenths of one percent (0.17%).

Question 6a. Does DOE concur with EIA's analysis? If not, why not?

Answer. DOE does not concur with EIA's analysis. See discussion of EIA's analysis in the answer to 5a.

Question 6b. What is DOE's estimate of the reduction in energy consumption in 2010 from the CCTI tax credits for buildings, industry, and transportation?

Answer. It is inappropriate to evaluate the benefits of the proposals for only one year. The benefits are expected to be long term because of the nature of the investments encouraged by the incentives and the effect of the incentives on the market for highly efficient technologies and renewable energy. The investments induced by the incentives are long-lived and, therefore produce energy savings and greenhouse gas reductions for many years after the investment is undertaken. For example, an energy-efficient new home can generate energy savings for several decades. The increase in market penetration of energy efficient technologies, new technologies, and renewable energy sources can transform markets. By improving the acceptance of those technologies in the marketplace and in some cases lowering the production costs of the targeted items, the incentives can move the market toward those investments, influencing purchases even after the credits are no longer in effect.

According to the Treasury Department, the present value of the energy savings for consumers and businesses over the lifetime of eligible items purchased through 2009 and covered by the tax incentives for buildings, industry, and transportation, is estimated to be between \$19 billion and \$29 billion.

Question 6c. What is DOE's estimate of the reduction in carbon emissions in 2010 from the CCTI tax credits for wind and solar power?

Answer. It is inappropriate to evaluate the benefits of the proposals for only one year for the reasons outlined in the answer to question 6b.

According to the Treasury Department, the tax credits for solar, wind and biomass are estimated to reduce greenhouse gas emissions 17 to 26 million metric tons of carbon equivalent over the lifetime of eligible purchases made through 2009. This estimate likely understates the benefits from this proposal for the reasons outlined in answer to question 5a.

Question 7. In its March 2, 1999 report to the House Science Committee, DOE's EIA states: "We are unable to link research and development expenditures directly to program results or to separate the impacts of incremental funding requested for fiscal year 2000 from ongoing program expenditures." In contrast, DOE appears to believe that it can estimate the results of R&D programs and funding increments for such programs. For example, the President's April 20th report states, "By 2010, DOE's building technology programs will lead to reductions in greenhouse gas emissions of up to 36 million metric tons of carbon equivalent annually." Similarly, the April 20th report states, "By 2010, DOE's renewable energy programs are expected to . . . reduce annual carbon emissions by nearly 24 million metric tons of carbon equivalent."

Question 7a. Does DOE believe that it can link R&D expenditures directly to program results, and that it can separate the impacts of incremental funding increases from ongoing program expenditures?

Answer. The projected energy and emission savings that are likely to result from the increased use of advanced renewable energy technologies and increased energy efficient products and end-use practices that have been supported by and would continue to be supported by our budget requests have been quantified through objective performance measures and supported by outside peer review. For example, the President's Committee of Advisors on Science and Technology reported in 1997 that DOE sponsored R&D investments in energy efficiency technologies have contributed to improvements in the use of energy that save U.S. consumers about \$170 billion each year. For several years, our criteria for estimating energy savings and environmental benefits and our projections of the return on our investment themselves have been aggressively peer-reviewed by outside groups, such as A.D. Little, and found to have substantial merit.

Our track record of R&D program success is impressive. In transportation, over 50 vehicle technologies that increase fuel efficiency and alternative fuel use and were developed with support from DOE's Office of Energy Efficiency and Renewable Energy (EERE) are now commercially available. In industry, 104 energy saving technologies supported by DOE are now in the marketplace saving \$1.8 billion since 1985. In buildings, consumer savings from just five technologies—advanced windows, electronic light ballasts, an efficient refrigeration compressor, an advanced burner for oil furnaces, and building energy software—have totaled more than \$30 billion since 1978. These savings alone amount to more than three times the entire R&D budget of EERE over the past twenty years—a fact that was not disputed by a 1996 GAO study. In the federal sector, reduced federal building energy costs today have saved taxpayers more than \$800 million per year as a result of efficiency and renewable energy projects.

In the past year we have provided the Congress with objective performance measures quantifying the impact of our EE budget, all components of which directly support the CCTI. The estimates of carbon savings derived from (current practices/market driven) adoption of efficiency and other sustainable technologies range from 75 to 115 million metric tons of carbon by 2010. We have also provided Congress with our 5-lab study which offers objective estimates of performance available from the major components of the CCTI based upon the United States adopting a business like approach to addressing the risks and responsibilities of domestic patterns of energy use while improving competitiveness. It concludes currently available technologies and others soon to be available could result in substantial reductions in U.S. carbon emissions if facilitated by aggressive Federal and State programs to encourage their deployment.

Question 7b. If so, please explain what facts or methods EIA failed to employ or take into account that would have enabled EIA to make the same emission reduction estimates as DOE.

Answer. In its Report, EIA makes what we consider to be conservative assumptions on the future ability and rate of technology penetration, with which we disagree. While acknowledging that "accelerating the adoption of new technologies in the market at lower costs through research, development, and deployment can help reduce carbon emissions and also can contribute positively to the overall quality of life," EIA cautiously uses historical R&D funding levels as their baseline, we expect

funding for energy efficiency and renewable energy to continue the growth experienced in recent years.

Their report even states that despite the limitations they see to the aggressive penetration of these technologies, this “do(es) not mean that the impacts of the research, development, and deployment programs could not be substantial over time.” EIA further finds that one possible alternative future to be “funding for research and development may accelerate the development of more efficient and advanced technologies at lower cost than might otherwise occur. In addition, research and development may tend to improve the characteristics of technologies that have already been developed to some degree. To the extent that continuing development lowers the costs of technologies or improves their efficiencies, reliability, or other attributes, the technologies become more economically competitive and attractive in the market.”

Question 8. Assuming DOE’s estimates are correct, the most cost-effective component of the entire CCTI is the proposal to extend the licenses of existing nuclear power plants. For an annual appropriation of \$5 million, this initiative will supposedly avoid 150 million metric tons of emissions per year. In other words, that \$5 million—about one-tenth of 1% of the Administration’s total climate change budget—accounts for more than all other projected emission reductions in the April 20th report.

Answer. There are 104 existing operating nuclear plants in the United States, all of which reach the end of their initial operating licenses over the next 20 years. As a source of electricity with no direct emissions of greenhouse gases, these nuclear power plants displace the equivalent of 150 million metric tons of carbon that would otherwise be produced by other sources of baseload electric power (based on total generating capacity and average plant productivity).

The Administration believes that the overwhelming majority of these plants can continue to operate safely, reliably, and efficiently well into the next century and that most of them will seek license renewals authorizing their operation for another 20 years. Industry is largely focused on short-term research and development aimed at issues associated with license renewal and more immediate returns on their investment. The Electric Power Research Institute, for example, is conducting about \$80 million in near-term research activities each year. As a result, we believe that most of the research that needs to be conducted for existing plants is being done by industry, which is appropriate given the capabilities of the nuclear industry and the maturity of most nuclear power technology.

However, we have identified a program of advanced research and development that is appropriate for the Department to conduct. The Department’s proposed Nuclear Energy Plant Optimization (NEPO) program, budgeted at \$5 million for FY 2000, which would be cost-shared with industry and coordinated with the Nuclear Regulatory Commission, would fill the void on intermediate term research by addressing longer-term issues such as aging and the introduction of advanced technologies to enhance safety, reliability, and economic operation of these plants.

This research program could lead to advances that would extend the useful life of existing nuclear power plants. If the program eventually added one year to the life of all plants now scheduled for retirement within the next 20 years, it would result in an emissions reduction of 150 million tons of carbon equivalent. However, since virtually all of the investment cost associated with extending the useful lives of these plants would be borne by the private sector, the ultimate decision as to how long nuclear plants in this country will continue to operate is a decision that must be made by the private sector.

Because of the substantial R&D and capital investment by industry in continued operation of nuclear plants, it is inappropriate to attribute the benefits of continued operation of these plants solely to the federal R&D investment. Rather, the return on investment must consider total public and private R&D and capital investment, including the substantial investment made by industry.

Question 8a. If global warming is the dire threat the Administration seems to believe it is, why doesn’t the Administration propose to license the construction of new nuclear power plants?

Answer. Ultimately, decisions to build nuclear power plants in the future are decisions best left to industry; however, the Department will continue to pursue R&D aimed at removing barriers to future construction and operation of new nuclear plants.

In the 1980’s and 1990’s the Department sponsored with industry, development of the advanced light water reactors. This successful activity resulted in three advanced nuclear power plant designs that were certified by the Nuclear Regulatory Commission and are now available to the world. With the completion of this program, the Department has completed a vital role in paving the way for new plants.

To further advance the state of the art of nuclear energy technology, the Department is conducting the Nuclear Energy Research Initiative, aimed at addressing barriers to long-term use of nuclear energy, such as nuclear proliferation, waste and economics. As an investigator-initiated R&D program, we have been very pleased with the response to it by industry, universities and the laboratories. In May 1999, the Department awarded 45 R&D projects that included participation by 21 universities, 8 national laboratories, and 16 private sector organizations.

Question 8b. In light of the apparent cost-effectiveness of nuclear power in avoiding carbon emissions, does DOE believe that environmental organizations like the Sierra Club should rethink their traditional opposition to nuclear power?

Answer. We believe that there is growing recognition by the public, including the environmental advocacy community, of the benefit that nuclear energy has in offsetting greenhouse gas emissions. Support for continuing the operation of existing plants in order to meet our international goals on climate change has, for example, increased over the last few years. However, we recognize that some of our stakeholders remain concerned over issues such as safety, proliferation, and waste. To address these concerns, the Department is conducting its Nuclear Energy Research Initiative. We hope that the environmental community will support this important research as we explore advanced technology solutions to the remaining concerns associated with the future utilization of nuclear power in the United States.

When concerns regarding safety, proliferation and environmental impacts are resolved satisfactorily, nuclear power will still have to compete with other energy sources and with measures to reduce demand through increased efficiency. While life extensions for many existing nuclear power plants do appear to be cost-effective and desirable, it is still uncertain whether new nuclear power plants will be able to compete successfully against the alternatives now available in the market-place. While the Federal Government can help by providing greater regulatory certainty and developing technology that overcomes technical barriers and reduces costs, ultimately, decisions on the nation's electricity supply will be made by industry based on the economics of the marketplace.

Question 9. DOE's EIA estimates that most of CCTI tax credits would go to "free riders"—those who would have purchased the energy efficient product or made the energy efficiency investment anyway, without a special tax preference or inducement. EIA estimates that free riders would constitute 60% of the people receiving tax credits for the purchase of natural gas heat pumps, 82% of the businesses receiving tax credits for investment in combined heat and power systems, 93% of the utilities receiving tax credits for investment in wind generation, 97% of the utilities receiving tax credits for investment in biomass generation, 98% of the people receiving tax credits for the purchase of alternative fuel vehicles, and nearly 100% of the people receiving tax credits for installation of rooftop solar power.

Question 9a. Do you concur with EIA's estimates of the extent of the free rider problem? If not, do you agree that the percentage of free riders for several of the proposed tax cuts would be large?

Answer. No, we do not concur with EIA's analysis. We believe the tax credits will be more successful than EIA predicts in encouraging increased sales of the technologies covered and, as a result, we believe that the percentage of free riders for the proposed tax incentives will be much lower than estimated by EIA. By focusing on those technologies which now have only a small share of the market, the Administration's proposals for tax incentives are intended to maximize the incremental effects of such incentives. See discussion of EIA's analysis in the answer to question 5a.

Question 9b. Does DOE have its own estimate of the percentage of free riders for each tax credit? If so, please specify for each proposed tax credit the likely percentage of free riders.

Answer. The CCTI tax package was designed to minimize free riders by focusing on items that offer superior energy efficiency and that presently account for a small share of the market. For example, items eligible for the 20 percent building equipment tax credit are top-tier technologies that offer superior energy efficiency compared to conventional equipment and generally account for less than one percent of market sales. Currently no vehicles sold in the U.S. are eligible for the tax credit for hybrid vehicles. The targeted technologies also have significantly higher purchase prices than conventional items and, at current market prices, are not universally cost effective. These high up-front costs are another reason relatively few would be purchased without the incentives. See discussion of the limited scope/methodology of EIA analysis in question 5a.

Question 9c. If EIA's estimates are correct, or even remotely in the ballpark, what environmental benefits would the CCTI tax credits for alternative fuel vehicles,

wind generation, and solar generation achieve beyond the business as usual baseline?

Answer. EIA's estimates are not correct. See discussion of EIA's analysis in answer 5a.

Question 10. In his testimony, Jerry Taylor of the Cato Institute argues that, even assuming the correctness of the Administration's emission reduction estimates, CCTI would provide essentially no protection from the potential risks of global climate change. Mr. Taylor makes the following observations: (a) the world's most advanced climate model predicts that full implementation of the Kyoto Protocol would lower global temperatures 0.07 degrees Celsius by the year 2050; (b) the U.S. emits about 20 percent of the world's greenhouse gases, which implies that U.S. compliance with the Kyoto Protocol would reduce global temperatures 0.014 degrees Celsius by 2050, (c) according to DOE and EPA, their contribution to CCTI would reduce U.S. greenhouse gas emissions by no more than 452 million metric tons—about 65 percent of the U.S. Kyoto target; (d) therefore, CCTI would reduce global temperatures .0091 degrees Celsius below where they otherwise would be by the year 2050. Mr. Taylor concludes: "Such a change in temperature is too small to measure. Moreover, I defy the administration to argue that this infinitesimal reduction in temperature will affect the lives of the American people one whit."

Question 10a. Do you concur with Mr. Taylor's assessment? If not, please specify which steps in his reasoning you disagree with and why?

Answer. Under the Framework Convention on Climate Change, as ratified by the Senate, the U.S. has a continuing obligation to reduce our emissions of greenhouse gases. The Climate Change Technology Initiative (CCTI) focused increased funding on the voluntary and R&D programs that had been proved to successfully reduce greenhouse gas emissions. The CCTI is critical to providing support for efforts in the U.S. to develop and deploy technology that will minimize potential costs of reducing U.S. emissions.

Question 10b. Mr. Taylor's analysis suggests that CCTI makes sense as climate change policy only in connection with the Kyoto Protocol and other, even more stringent greenhouse gas emission control treaties. Yet, in the Conference Report accompanying the 1999 VA-HUD Appropriations Act, Congress instructed the Administration to show how "these [climate change] programs are justified by goals and objectives independent of implementation with the Kyoto Protocol." Please explain why CCTI is sensible climate change policy separate and apart from the Kyoto Protocol.

Answer. Again, under the FCCC, as ratified by the U.S. Senate, the U.S. has a continuing obligation to reduce greenhouse gas emissions. The programs in the CCTI are important not only because they help reduce greenhouse gas emissions, but also because they save businesses and consumers money, increase U.S. competitiveness, improve air quality and help ensure our energy security.

RESPONSES TO QUESTIONS FROM SENATOR GRAHAM

Question 1. In light of the importance of nuclear power in reducing gas emissions, can you explain the relatively small amount of funding for nuclear power research efforts?

Answer. As you know, in fiscal year 1998, the Department proposed a program of nuclear power research that was rejected by Congress. Since then, we have worked closely with Congress and the research community to establish some very exciting new activities. At the core of the new activities is the Nuclear Energy Research Initiative (NERI) to conduct new and innovative long-term research and development to maintain nuclear energy as a viable option for the future. We had requested \$24 million for this new program for fiscal year 1999 and Congress appropriated \$19 million. We had an overwhelming response to this program, with over 300 proposals submitted to the Department, many of which represented significant level of collaboration among universities, laboratories, the private sector, and international R&D organizations. These proposals were put through a rigorous, independent, competitive peer-review process and in May 1999, we awarded funding to the top 45 research projects in areas such as development of proliferation-resistant technologies, waste, instrumentation, and fundamental nuclear science.

In fiscal year 2000, we are proposing an increase to \$25 million to continue important work begun this year and to award a modest number of new research grants.

This fiscal year, we are proposing a new program, Nuclear Energy Plant Optimization, initially funded at \$5 million, aimed at improving the efficiency and reliability of existing nuclear power plants. As a cost-shared program with industry, it would focus on issues such as aging and materials degradation and on advanced technologies that could improve reliability, efficiency, and safety.

We hope Congress will support us as we seek to increase funding for these important activities in the future, as they prove their value to the long-term interests of the nation.

Question 2. Which of DOE's programs engages international participation?

Answer. The Department of Energy is now supporting a broad range of programs designed to encourage other countries, especially developing countries, to actively participate in global efforts to limit curb greenhouse gas emissions. These efforts have included support for the U.S. Country Studies and Activities Implemented Jointly programs, and now include leadership of the international Climate Technology Initiative established and supported by twenty-three industrialized countries and the European Commission.

Recently, Secretary Richardson has personally led an effort to encourage developing countries to increase their participation in the global efforts to reduce greenhouse gas emissions.

DOE program offices continue to support a broad range of cooperative R&D and technology transfer programs with many different countries. Some examples of these efforts include:

The Office of Energy Efficiency and Renewable Energy participates in the U.S. Country Studies program which helps developing countries meet their commitments under the U.N. Framework Convention on Climate Change (national greenhouse gas inventories and national communications). The USIJI is the largest and most well developed pilot program to encourage developing and developed countries work cooperatively to reduce their greenhouse gas emissions. The Clean Cities program provides technical and financial assistance in the transportation sector to help developing countries reduce local pollution problems using energy efficiency technologies as well as to reduce greenhouse gas emissions. The Industries of the Future program has been replicated in a few developing countries, works to improve energy efficiency and reduce greenhouse gases. We also work cooperatively with the International Energy Agency and other multinational organizations to evaluate and demonstrate clean energy technologies in both developed and developing countries.

The Office of Fossil Energy contributes to multilateral research on carbon sequestration through the International Energy Agency, and through separate multilateral agreements.

Our Nuclear Energy program is leading a broad effort to engage other nations in advancing the state of the art in nuclear energy technology. The program has recently established cooperative agreements with Japan and Korea and will soon execute new agreements with France and at least two countries in South America. We believe that this cooperation is imperative to leverage U.S. funding for nuclear R&D and to provide U.S. leadership in coordinating the use and development of the international nuclear technology infrastructure.

Question 3. What are some examples of programs DOE has undertaken that have resulted in the deployment of useful technologies?

Answer. Office of Building Technology State and Community Programs: Consumer savings totaling more than \$33 billion since 1978. A recent example is the Department's Energy Star program. In 1998, more than 50 manufacturing partners signed on to the Energy Star program to produce and label Energy Star windows, doors, and skylights. Currently, more than 2,000 retail store partners (including such giant national chains as Home Depot, Circuit City, and Montgomery Ward), 33 utilities, and nine major appliance manufacturers nationwide stock and promote Energy Star products.

Office of Industrial Technologies: Over 100 energy saving technologies in the market; saving \$2.1 billion since 1985. The Bethlehem Steel Corporation recently joined with the Department's Office of Industrial Technologies to showcase energy saving technologies for the steel sector. To remain competitive in the global marketplace, U.S. steel producers must reduce production costs while improving the quality of their products. A critical component of lowering overall production costs is reducing energy consumption during production. Bethlehem Steel's Burns Harbor, Indiana, steel mill will install six advanced steel making technologies and processes, that if implemented throughout the steel industry, could provide net energy savings by 2005 of over 93 million Btu per year, the equivalent of \$198 million.

Office of Transportation Technologies: Over 50 models of cars and trucks, using fuel efficiency technologies and alternative fuels are saving 2 billion gallons of conventional fuel a year, consumer savings since 1978 near \$10 billion, oil savings near 20 billion gallons. The Department's Clean Cities Partnership Program is a voluntary, locally based, government/industry partnership to expand the use of alternative fuel vehicles (AFVs) and by building a local AFV refueling infrastructure. Over the past four years, 67 communities have joined the Clean Cities effort, enabling deployment of more than 200,000 AFVs in both public and private fleets. The

vehicles will reduce gasoline and diesel fuel use by an estimated 210 million gallons per year and emissions by an estimated 54,000 metric tons through 2005.

Office of Power Technologies: Renewable energy costs are down 80% since 1980. Over \$5 billion in U.S. produced renewable sales this decade. World's Largest Wind Power Facility. In 1998, Enron Wind Corporation began operation of the world's largest wind power facility, a project of 143 wind turbines spread across 15 miles of farmlands near Lake Benton, Minnesota, for a total generating capacity of 107 MW. Enron has publicly credited their research partnerships with the Department as essential to the development of the technology making this wind plant possible. Enron's turbine manufacturing subsidiary, Zond Energy Systems Inc. of Tehachapi, California, partnered with the Department under its wind turbine research and field verification programs for the development of the Z-550, Zond's first commercial wind turbine. The advanced design tools, technical assistance, testing capabilities, and utility operating experience made possible by the Department's Wind Program were critical to the successful development of Zond's Z-750 turbine used in the Minnesota project. Enron Wind Corp. has several hundred additional megawatts of wind power now under development.

Office of Nuclear Energy: In the nuclear area, our success has been impressive. For example, DOE's research in the development of high-burn-up nuclear fuel led to the increase in utility nuclear plant refueling periods from only 12 months to today's more standard 18 and 24 months—this saves Americans some \$200 million each year and reduces the generation of spent fuel in the U.S. by one-third. Our work in reducing occupational radiation exposures has decreased the exposure of nuclear power plant workers by 67 percent since 1985, saving about \$40 million annually. For example, DOE supported R&D associated with the first BWR and PWR primary system decontaminations, mitigation of stress corrosion cracking of BWR piping, developing flow induced vibration failure models, development of an advanced pump monitoring system, and development of a micro-computer based outage management system. Together, these projects reduced the need to inspect equipment, unnecessary maintenance on equipment, plant equipment failures, and improved efficiency of outages. Additionally, in the 1997, the Department completed with industry, the Advanced Light Water Reactor program. This program resulted in the Nuclear Regulatory Commission's certification of two advanced nuclear power plant designs, with a third expected late this year. These designs put U.S. technology at the top of the class in a world market for nuclear power plants and will create thousands of high-technology jobs at U.S.-designed plant, built in countries such as Japan, Korea, and Taiwan.

Office of Fossil Energy: FE has a long history of working with the private sector to improve the effectiveness of pollution control technologies, while reducing costs. About one-fourth of the U.S. coal-fired powerplants are equipped with 14 scrubbers to control sulfur dioxide emissions. Cumulative savings on these improved systems, compared to the state of technology when they were first introduced in the early 1970's, is over \$40 billion. FE has also sponsored research which dramatically improved the performance of nitrogen oxide control technology, while sharply reducing costs.

Power magazine called the development of fluidized bed coal combustors "the commercial success story of the last decade in the power generation business." This success, perhaps the most significant advance in coal-fired boiler technology in more than half a century, was achieved largely through research, development and demonstration sponsored by the Department of Energy and its predecessors. U.S. vendors have sold \$9 billion of fluidized bed combustion systems domestically and abroad.

In addition to hardware, FE has developed breakthrough software products.

Modeling an energy or chemical process on a computer is a much more affordable way to try different process configurations prior to building or modifying actual plant hardware. Today one of the standard process simulation models in use by industry is the product of a DOE-funded development effort. In the late 1970s DOE funded the initial code for the ASPEN model at the Massachusetts Institute of Technology. Guided by an advisory committee made up of more than 50 industrial participants, ASPEN became one of the most flexible and powerful computer software programs for the chemical and energy industry. Developers of the model founded AspenTech in 1981 to commercialize the technology. AspenTech has since evolved into a fast growing, high-tech company with nearly \$58 million in annual sales. The company now has more than 450 commercial customers for the process simulation model, including 42 of the 50 largest chemical companies in the world.

Question 4. What are the costs of "doing nothing" to address climate change?

Answer. The Administration did not undertake an independent assessment of the climate change-related economic and environmental effects of climate change risks.

However, we did review several existing analyses from the economics literature on this issue. These studies found that doubling of atmospheric concentration of carbon dioxide could result in annual U.S. economic costs on the order of 1% of GDP. Please refer to pages 69-70 of "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis" for more discussion of these studies.

The Administration did make an illustrative calculation of the possible air quality ancillary benefits associated with abating greenhouse gases. By reducing emissions of carbon dioxide, emissions of the particulate matter and ozone precursors are also reduced. We found that the economic benefits of reducing emissions of these local air pollutants could offset at least one-quarter of the direct resource costs from abating greenhouse gases. Please refer to pages 66-69 of "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis" for more discussion of this analysis.

Question 5. Which of DOE's programs would have the greatest near term impact on reducing greenhouse gas emissions?

Answer. The Department has a great number of programs that are expected to have near term impacts on greenhouse gas emissions. Let me note a few of the numerous examples of programs in the Office of Energy Efficiency and Renewable Energy which yield carbon savings in the near term. In the year 2005, the Rebuild America and Energy Star programs, which are managed by the Office of Building Technology, State and Community Programs, are expected to reduce carbon emissions by the equivalent over 2 million metric ton of carbon equivalent (mmtc) per year. In the same time frame, the DOE-issued appliance standards rules for the four priority products (fluorescent lamp ballasts, clothes washers, water heaters and central air conditioners) as well as support for state building energy codes are expected to reduce carbon emissions by the equivalent of over 4 mmtc per year. In the Office of Industrial Technologies, the Petroleum Refining Vision projects carbon savings of over 2 mmtc in 2005. In the Office of Power Technologies, the Biomass Power program projects a carbon savings of over 5 mmtc in 2005. In the Office of Transportation Technologies, the Heavy Duty Vehicle Technology program projects carbon savings of about 1.3 mmtc in 2005.

Question 6. A large part of the DOE programs are directed at increasing energy efficiency. As I understand it, U.S. imports of foreign oil are over 50% of consumption and expected to reach as much as 65% in the next 15-20 years? Would you consider greater energy efficiency as high a goal as reducing greenhouse gas emissions in your current programs?

Answer. Energy Efficiency is not a goal in and of itself, rather, the Department promotes cost-effective energy efficiency improvements because they reduce our Nation's reliance on oil and oil imports, increase the competitiveness of our economy, especially over the long term, and because they can help reduce harmful air emissions such as carbon dioxide, sulfur dioxide, nitrogen oxides and more.

In its *1999 Annual Energy Outlook*, the Energy Information Administration projects that oil imports will reach 66% by 2010 and 71% by 2020. The vehicle transportation sector in this country remains 97% reliant on petroleum for fuel. For these reasons, we have focused our advanced transportation efforts on technologies that can dramatically improve vehicle efficiency: up to three times the fuel economy (80 mpg) of comparable conventional vehicles for automobiles, and 35% improvement in fuel efficiency for sport utility vehicles and minivans. We also support research and development work to enable alternative fuels and fuel components to displace petroleum as transportation fuel. Reduction in greenhouse gas emissions, generally proportionate to an increase in fuel efficiency, is a concurrent benefit achieved by improving the efficiency of transportation energy use.

Question 7. Is the Administration attempting to implement the Kyoto Protocol through the "backdoor"?

Answer. No. The CCTI proposals and other actions by the Administration are fully consistent with the U.S. Government's current commitments (ratified by the U.S. Senate) under the Framework Convention for Climate Change and represent prudent efforts to minimize the cost of constraining greenhouse gas emissions, as well as meet a number of other important goals, such as clean air, increased U.S. competitiveness, energy cost savings for businesses and consumers, and energy security.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC, August 18, 1999.

Hon. T.J. GLAUCHIER,
Deputy Secretary of Energy, Department of Energy, Washington, DC.

DEAR DEPUTY SECRETARY GLAUCHIER: Thank you for the Department of Energy's (DOE's) July 15, 1999 letter responding to the questions Senator Don Nickles and I sent you on May 27th about DOE's role in global climate change policy and other issues discussed at the May 20th joint House-Senate hearing. In the present letter, I will offer some comments and raise additional questions about some of DOE's responses.

In your response to Question 1, you acknowledge the incompleteness of the Office of Management and Budget's (OMB's) search pursuant to a Congressional subpoena on global climate change policy. These documents might more fully explain the Clinton Administration's decision to increase its five-year spending request for climate change policy from +\$5.0 billion in October 1997 to +\$6.3 billion in February 1998. Other agencies complied with my request for a full document search, including multiple drafts and incoming memos or e-mails. I remain deeply concerned that OMB was not fully responsive to the subpoena but appreciate your candor in acknowledging that fact now.

In your response to Question 4, you state that "Program elements of CCTI [Climate Change Technology Initiative] should not be evaluated *solely* on the basis of the Federal cost per ton of the resulting emission reductions" (emphasis added). While that statement makes perfect sense, the same cannot be said of DOE's contention that the per-ton cost of emissions reduced is not "a valid indicator of program effectiveness" (emphasis added).

The Administration either stands by the Council of Economic Advisers' (CEA's) \$14 to \$23 per ton estimate of the cost of implementing the Kyoto Protocol, or it does not. If it does, then the "Janet Yellen Test" provides a benchmark, even if not the sole benchmark, for evaluating the cost-effectiveness of the CCTI programs. Indeed, common sense suggests that voluntary programs (such as the CCTI) should cost less than mandatory programs (such as those required for full implementation of the Kyoto Protocol). Therefore, it is disappointing that, except for the Fossil Energy carbon sequestration program, DOE provides no cost per-ton estimates for the CCTI programs.

In your response to Question 6a, you state that DOE does not concur with the Energy Information Administration's (EIA's) estimate that the CCTI tax credits for wind and biomass generation would reduce carbon emissions in 2010 by a mere 0.17 percent. However, you do not reveal what DOE believes to be the correct estimate. Is that because DOE considers it "inappropriate to evaluate the benefits of the [CCTI] proposals for only one year," as you state in the answers to Questions 6b and 6c? Please provide emission reduction estimates for each CCTI tax credit over multi-year periods, specifically 2000-2010, 2000-2015, and 2000-2020. For perspective, please also provide estimates of total emissions during those periods under a business-as-usual scenario, and the relative (percentage) reduction of emissions attributable to the CCTI tax credits.

In your response to Question 8, you state that if the CCTI nuclear program "added one year to the life of all [nuclear power] plants now scheduled for retirement within the next 20 years, it would result in an emissions reduction of 150 million tons of carbon equivalent." Although I assumed the correctness of this estimate in the May 27th letter, I now question whether it is accurate.

Electric generation from nuclear power is projected to be about 659 billion kilowatt hours (kWh) in the year 2000 (EIA, *Annual Energy Outlook 1999*, Table A-8). According to EIA, retirements during the following two decades are projected to decrease nuclear generation to 359 billion kWh—a reduction of 300 billion kWh (*AEO99*, Table A-8). This is the maximum amount of generation that avoiding nuclear retirements would save over the next two decades.

In year 2000, coal plants are projected to generate 1,931 billion kWh (*AEO99*, Table A-8) and emit 519 million metric tons of carbon (*AEO99*, Table A-19). Therefore, the emissions rate for coal generators is 0.30 million tons of carbon per billion kWh (rounded up). If the extended nuclear generation replaces only coal plants, then the carbon emissions avoided will be $0.3 \times 300 = 90$ million metric tons (mmt)—three-fifths of the amount DOE projects. If, in fact, extended nuclear generation only avoids the construction of advanced combined cycle gas plants that meet new electricity demand, avoided emissions will be significantly less, closer to 30 mmt, or about one-fifth of the amount DOE projects (*AEO99*, Tables A-8 & A-19).

EIA's estimate of the reduction in nuclear generating capacity due to scheduled plant retirements over the next 20 years (*AEO99*, Table A-9) tracks closely with that of the U.S. Nuclear Regulatory Commission (*Information Digest*, NUREG-1350, Vol. 9, Table 12, p. 46). Please explain how DOE arrived at its estimate of 150 mm of carbon equivalent avoided. Did DOE assume that all avoided capacity would be coal-based electricity? Did DOE assume that the CCTI nuclear program would extend the operating life of all nuclear power plants or only those scheduled for retirement in the next 20 years?

In your response to Question 9, you state that DOE does not concur with EIA's estimate that a large percentage of CCTI tax credits would go to "free riders." However, you did not respond directly and fully to Question 9b, which asked whether DOE has its own estimate of the percentage of free riders for each tax credit. Unless DOE has made its own estimates, and is prepared to share them, it is difficult to put much stock in DOE's criticism of EIA's estimates. Therefore, I am obliged to restate my question. Does DOE have its own estimates of the extent to which CCTI tax credits would go to free riders? If not, why not? If so, please provide those estimates to the Subcommittee.

Pursuant to the Constitution and Rules X and XI of the House of Representatives, I request that DOE provide detailed responses to the questions raised above. Please provide the information requested by Friday, September 10, 1999 to the House Subcommittee staff in room B-377 Rayburn House Office Building. If you have any questions, please contact Subcommittee Staff Director Marlo Lewis at 225-1962.

Thank you in advance for your attention to this request.

Sincerely,

DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs.

DEPARTMENT OF ENERGY,
CONGRESSIONAL AND INTERGOVERNMENTAL AFFAIRS,
Washington, DC, September 1, 1999.

Hon. DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs, Committee on Government Reform, U.S. House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: On May 20, 1999, T.J. Glauthier, Deputy Secretary of Energy, testified regarding the Administration's proposals under the Climate Change Technology Initiative.

Enclosed are the answers to questions submitted on behalf of you to Jay E. Hakes, Administrator, Energy Information Administration, to complete the hearing record.

If we can be of further assistance, please have your staff contact our Congressional Hearing Coordinator, Lillian Owen on (202) 586-2031.

Sincerely,

JOHN C. ANGELL,
Assistant Secretary.

[Enclosure.]

RESPONSES TO QUESTIONS FROM CHAIRMAN MCINTOSH

Question 1. CEA Chair Janet Yellen estimates that the Kyoto Protocol, if flexibly implemented, would cost the U.S. no more than \$14 to \$23 for every ton of carbon reduced or avoided. The Administration emphasizes that the CCTI programs are "completely voluntary." If designed properly, voluntary programs, such as the CCTI tax credits, should cost less than mandatory programs, such as those required for full implementation of the Kyoto Protocol.

a. For each of the proposed CCTI tax credits, what is the cost per ton of carbon reduced or avoided in Fiscal Year (FY) 1999 dollars? Please estimate the tax revenue losses using different discount rates, for example, 0%, 7%, and 15%.

Answer. It is possible to calculate a rough tax revenue loss per ton of carbon reduced. There are several possible methods of calculating such discounted values, two of which are used here. Under one approach, only estimated Federal tax expenditures would be discounted. Under the second approach, both the estimated Federal tax expenditures and the estimated emission reductions would be discounted. Because there is often disagreement about whether it is appropriate to discount non-

monetary values, such as tons of carbon-equivalent emissions avoided, we have calculated the estimated values using both approaches. The tax expenditure per ton of carbon emissions reduced is calculated by dividing the net present value (NPV) of cumulative expenditures by the NPV of carbon emissions reductions over the 2000-2020 period in one case and the carbon emission reductions over the 2000-2020 period in the other case. The values are presented with no discounting, and 7 percent and 15 percent real discount rates, all in calendar year 1999 dollars.

Note that the tax expenditure per ton of carbon emissions reduced increases with the assumed discount rate if the tons of carbon emissions are discounted. This is because the tax expenditures occur early in the projection period while the carbon emissions reductions persist for the life of the investment.

There is wide variation across the proposed tax credits in the average tax revenue loss per ton of carbon emissions reduced. Using a 0 percent discount rate, the values vary from \$19 to \$167 per ton; for a 7 percent discount rate, the values range from \$29 to \$273 if carbon emissions are discounted and \$16 to \$128 if carbon emissions are not discounted; and for a 15 percent discount rate, they range from \$40 to \$406 if carbon emissions are discounted and \$14 to \$96 if the carbon emissions are not discounted.

ESTIMATED TAX EXPENDITURE PER TON OF CARBON EMISSIONS
REDUCED

Sector/program	Discount rate				
	0%	7% emissions discounted	7% emissions not discounted	15% emissions discounted	15% emissions not discounted
Buildings, equipment	75	103	62	135	51
Buildings, shell	167	273	128	406	96
Industrial CBP	28	49	26	76	25
Utility, biomass	60	103	41	170	29
Utility, cofiring	19	29	16	40	14
Utility, wind	142	222	98	347	68
Total, weighted average with transportation*	133	173	95	206	68

*Weighted by tax expenditures. Includes the transportation sector which has estimated tax expenditures but relatively small carbon emissions reductions.

Source: Energy Information Administration, Office of Integrated Analysis and Forecasting.

Question 1b. What is the average revenue loss of the proposed CCTI tax credits per ton of carbon reduced?

Answer. Across all the proposed tax credits, the estimated weighted average cost per ton of carbon emissions reduced is \$133 using the 0 percent discount rate, \$173 using a 7 percent discount rate if carbon emissions are discounted and \$95 if the carbon emissions are not discounted, and \$206 using a 15 percent discount rate if the carbon emissions are discounted and \$68 if the carbon emissions are not discounted. This weighted average includes the transportation sector which has estimated tax expenditures but very small net carbon emissions reductions in the EIA projections.

Question 1c. In his prepared testimony for the joint hearing (p. 7), Jerry Taylor of the Cato Institute estimates that the heat pump tax credit would cost \$349 per ton of carbon reduced. In fact, says Taylor, if we assume a 10% discount rate, the cost of the heat pump tax credit rises to \$666 per ton of carbon reduced. What is the Energy Information Administration's (EIA's) estimate of the tax expenditure costs of the heat pump tax credit, assuming both a 0% and a 10% discount rate? If possible, please also provide the tax expenditure costs for other CCTI-targeted technologies.

Answer. The estimates for costs of reduced carbon emissions provided by Jerry Taylor of the Cato Institute are calculated by assuming that one unit of the tax-credited technology is purchased in place of a mid-efficiency unit currently offered in the market. This calculation is different from that provided in EIA's CCTI analysis where adoption of the technology is based on assumptions about consumer behavior. The analysis that follows estimates the cost of reduced carbon emissions based on Taylor's methodology corrected for two basic errors in the calculations as described below.

In his testimony, Taylor cites research by Ronald Sutherland of the American Petroleum Institute as the source for the estimates of costs of reduced carbon emissions for the air-source heat pump tax credit. In his analysis, Sutherland used EIA energy intensities and technology cost and performance characteristics to estimate the cost of reduced carbon emissions for the heat pump tax credit. However, in the Sutherland analysis, the heat pump tax credit was not subjected to the 20 percent cap of the installed cost that was a part of the CCTI tax proposal. By not incorporating the cap, the estimated tax credit used in the analysis increased from \$500 to \$1100. Imposing the cap would shift more than half the increased cost of the more efficient heat pump to the consumer, thus reducing the government's share of the cost of reduced carbon emissions by more than half. In addition, the Sutherland analysis assumes that the consumer's alternative to purchasing the high-efficiency heat pump is a mid-efficiency unit. While many consumers do purchase the mid-efficiency unit, the least efficient unit required by law is more often purchased by both builders and homeowners alike, since it is often the cheapest unit to purchase.

The table below provides EIA estimates of the cost of reduced carbon emissions for several technologies offered tax credits by the CCTI. These estimates compare carbon emissions reductions by purchasing the high-efficiency unit offered the tax credit with purchasing the least efficient unit available. Comparing the tax credit-eligible unit with a mid-efficiency unit would yield higher costs, since the energy and carbon emissions savings are incrementally lower. Also, the appropriate tax credit cap was applied. Our calculation, based on Sutherland's methodology and corrections for the two errors described above implies a cost per ton of \$88 at a 0 percent discount rate compared to \$349 for Taylor/Sutherland and \$136 at a 10 percent discount rate compared to \$666 for Taylor/Sutherland.

GOVERNMENT COST OF CONSERVED CARBON FOR VARIOUS
TECHNOLOGIES OFFERED TAX CREDITS IN THE CCTI (\$1998)

Technology	Cost per ton (0% discount)	Cost per ton (10% discount)
Air-source heat pump	\$88	\$136
Central air conditioner	\$290	\$433
Heat pump water heater	\$119	\$184

Question 1d. Which, if any, of the CCTI tax credits costs less than \$14 to \$23 per ton of carbon reduced?

Answer. Using EIA's projections, utility cofiring falls within the \$14 to \$23 range in the absence of discounting carbon emissions. Projected tax expenditures per ton of carbon emissions reduced for all other proposed tax credits are above the \$23 level according to the EIA calculations. Note that this comparison measures two different factors. The EIA measure calculated the Federal cost per ton of carbon reduced that result primarily the tax incentives; that is, the EIA estimate is derived by dividing the net present value of the loss in Federal tax revenues by the cumulative tons of carbon reduced from the baseline (discounted and un-discounted) to give EIA's two measures of the cost per ton of carbon reduced. The Administration's measure of the cost of carbon reduction does not incorporate losses of revenues from tax incentives or synergies with other specific Administration policies for achieving the Kyoto Protocol. The Administration's low carbon permit prices are achieved by assuming significant participation by developing countries (like China and India) and the application of the carbon price in all U.S. energy markets.

Question 2. In its March 2, 1999 report to the House Science Committee, EIA states: "We are unable to link research and development expenditures directly to program results or to separate the impacts of incremental funding requested for fiscal year 2000 from ongoing program expenditures." In contrast, the Department of Energy (DOE) appears to believe that it can estimate the results of research and development (R&D) programs and funding increments for such programs. For example, the President's April 20th report to Congress on climate change policy states, "By 2010, DOE's building technology programs will lead to reductions in greenhouse gas emissions of up to 36 million metric tons of carbon equivalent annually." Please explain why EIA believes it is not possible to link R&D expenditures directly to program results or to separate the impacts of incremental funding increases from ongoing expenditures.

Answer. EIA has previously testified that it cannot link specific expenditures for research and development directly to the achievement of specific program goals. Although it might be possible to do so, the task would be very daunting, requiring much research and data that may not be available.

It is difficult to relate R&D programs, private or public, to successful innovation and subsequently to the market penetration of products, although an overall linkage to innovation is generally acknowledged. A further difficulty in predicting the adoption of new equipment is that equipment purchases are affected by economic factors and consumer preferences that often can not be foreseen at the R&D stage. In addition, ultimate future success in the market place may be highly influenced by the relative success of other products whose future existence cannot be easily predicted. These reasons make it very difficult to link ultimate market penetration of particular technologies to the R&D needed to invent those technologies.

Question 3a. What is EIA's estimate of the percentage of the CCTI tax credits that would go to "free riders"—people or businesses who would have purchased the energy efficient product or made the energy efficiency investment anyway, without a special tax preference or inducement?

Answer. The following represents EIA's estimate of the percentage of the CCTI tax credits that would go to businesses or consumers who are projected by EIA to make the investment in the energy-efficient products even in the absence of the proposed tax credit ("free riders"—Our analysis does not permit the results to be itemized by technology in the commercial sector. Our results indicate that the tax incentives are insufficient in amount and/or duration to transform the market in most cases.

Program	Percent free rider
Buildings	
Energy efficient equipment for residential sector ¹	18%
Natural gas heat pumps	61%
Air-source heat pumps	18%
Central air conditioners	17%
Heat pump water heater	4%
Energy efficient new homes	24%
Rooftop solar equipment	Almost 100%
Industrial	
Combined heat and power systems	82%
Transportation	
Electric, fuel cell and electric hybrid vehicles	98%
Electric generation	
Combined programs	54%
Biomass	97%
Wind	93%
Biomass cofiring	38%

¹ Numbers not available for the commercial sector.

Question 3b. Based on EIA's estimate of the percentage of free riders, what environmental benefits, if any, would the CCTI tax credits for alternative fuel vehicles, wind generation, and solar generation achieve beyond the business as usual baseline?

Answer. Over the entire 2000 through 2020 timeframe and adjusting for EIA's projections of "free riders", it is estimated that increased wind generation reduces cumulative greenhouse gas emissions by 2 million metric tons of carbon. Adjusting for free riders, the cumulative greenhouse gas emissions savings for alternative fuel vehicles is estimated to be 0.2 thousand metric tons of carbon. Since rooftop solar equipment's free rider share is estimated to be almost 100 percent, the cumulative greenhouse gas savings would be negligible. These CCTI tax incentives expire on or before 2006 and the analysis does not assume their extension. Virtually all of the estimated savings are attributed to investments projected to be made between now and 2006.

Question 4a. EIA's Annual Energy Outlook 1999 (AE099) includes projections for energy efficiency and carbon emissions for the years 2000 through 2020. What impact would the Administration's tax credit proposals have on energy efficiency and carbon emissions during 2000-2020 relative to: (1) the EIA reference case (which assumes continuing R&D and related energy-efficiency improvements), and (2) the 1999 technology scenario (which assumes no further improvements in energy efficiency)?

b. Please break out the results of your answer to the foregoing question by sector (i.e., transportation, commercial, industrial, residential), and by any subsectors analyzed in EIA's model.

Answer. The projected impacts of the Administration's tax credit proposals on energy consumption and greenhouse gas emissions as reported in EIA's Analysis of the Climate Change Technology Initiative are given below. Since each of the tax proposals was examined separately by EIA, they are shown by sector and aggregated for a total. An integrated analysis including all of the tax credit proposals and feedback on prices, however, probably would yield a slightly different result than that presented here. Projected greenhouse gas emissions attributable to the industrial sector are estimated to be lower under the tax proposals, even though delivered energy consumption is higher because natural gas-fired cogeneration is projected to be displacing purchased electricity, which has a lower efficiency. EIA has not analyzed the Administration's tax credit proposals with respect to the 1999 technology scenario. However, it is expected that savings similar to those projected relative to the reference case would be realized since technology availability does not change significantly between 1999 and 2004 in the reference case in EIA's analyses.

ESTIMATED CUMULATIVE SAVINGS OF CCTI TAX PROPOSALS RELATIVE TO THE REFERENCE CASE, 2000–2020

Sector	Reduction in delivered energy use (Trillion Btu)	Reduction in greenhouse gas emissions (Million metric tons of carbon)
Residential	451.6	21.1
Commercial	31.7	1.7
Industrial	¹ -23.5	3.0
Transportation	12.4	0.01
Total	472.2	25.8

¹Delivered consumption increases for the industrial sector due to increased natural gas used for cogeneration. Primary energy use is projected to decline since the cogenerated electricity replaces purchased electricity.

The following table provides EIA's estimates of the impact of the Administration's tax credit proposals on an energy use measure for each of the demand sectors. The estimated impact of the tax credit proposals on the projected efficiency of the stock fleet of light-duty vehicles is provided for the transportation sector. The estimated impact of the tax credit proposals on an appropriate intensity measure (energy use per some "unit measure"³) is provided for each of the other three demand sectors. A decreasing intensity measure provides an indication of efficiency improvement, provided that other factors, such as the structure of the industrial sector, remain unchanged. The table indicates that the CCTI incentives are projected to have their greatest impacts on energy intensity by the end of the incentive period and gradually diminish after credits are no longer available.

ESTIMATED INTENSITY/EFFICIENCY EFFECTS OF CCTI TAX CREDIT PROPOSALS RELATIVE TO THE REFERENCE CASE, 2000–2020

Sector	Percent change relative to the EIA reference case				
	2000	2005	2010	2015	2020
Residential intensity (million Btu/household)	-0.049%	-0.287%	-0.256%	-0.116%	-0.049%
Commercial intensity (thousand Btu/square foot)	-0.010%	-0.028%	-0.017%	-0.011%	-0.008%
Industrial intensity* (thousand Btu/dollar of gross output)	0.001%	0.004%	0.004%	0.004%	0.004%
Transportation efficiency (light duty vehicle mpg)	0.0%	0.0%	0.0%	0.0%	0.0%

*Delivered intensity is projected to increase for the industrial sector due to increased natural gas used for cogeneration.

Question 5. For each sector, describe the technologies assumed to be deployed and commercially available in the AE099 reference case.

Answer. The technologies assumed to be available in the electric generating sector are represented in the following table, which shows the assumed year of availability, capital cost, and heat rate.

COST AND PERFORMANCE CHARACTERISTICS OF NEW CENTRAL STATION
ELECTRICITY GENERATING TECHNOLOGIES

Technology	Year	Capital costs nth-of-a-kind (\$1997/kW)	Heatrate nth-of-a-kind (Btu/kWhr)
Scrubbed coal new	1997	1,093	9,087
Integrated gas combined cycle	1997	1,091	6,968
Gas/oil steam turbine	1997	1,004	9,500
Conv gas/oil combined cycle	1997	445	7,000
Adv gas/oil combined cycle	1997	405	6,350
Conv combustion turbine	1998	329	10,600
Adv combustion turbine	1997	325	8,000
Fuel cells	2001	1,458	5,361
Advanced nuclear	2001	1,570	10,400
Biomass	2001	1,448	8,219
MSW	1996	5,892	16,000
Geothermal	1997	1,831	N/A
Wind	1997	776	N/A
Solar thermal	1997	1,907	N/A
Photovoltaic	1998	2,903	N/A

Source: Values are derived by the Energy Information Administration, Office of Integrated Analysis and Forecasting from analysis of reports and discussions with various sources from industry, government, and the National Laboratories.

The representation of technologies in the AE099 reference case varies by demand sector, reflecting the diverse nature of energy use. The industrial sector represents technological change, rather than individual technologies as described below. The residential, commercial and transportation sectors all contain detailed characterizations that include a variety of conventional and newly available technologies. The technology menus for these sectors also include technologies currently under development that are projected to become available later in the forecast. The great number of technologies represented prevents us from describing each technology individually. However, the attached lists for each of the three sectors contain a number of energy efficient and emerging technologies included in the AE099 reference case to illustrate the types of technologies assumed to be available.

TRANSPORTATION TECHNOLOGIES—STANDARD TECHNOLOGY MATRIX FOR CARS

	Fractional fuel effi- ciency change	Incremental cost (1990 \$)	Incremental cost (\$/Unit Wt.)	Incremental weight (Lbs.)	Incremental weight (Lbs./ Unit Wt.)	Fiscal year in- troduced	Fractional horsepower change
Front Wheel Drive	0.060	160	0.00	0	-0.08	1980	0
Unit Body	0.040	80	0.00	0	-0.05	1980	0
Material Substitution II	0.033	0	0.60	0	-0.05	1987	0
Material Substitution III	0.066	0	0.80	0	-0.10	1997	0
Material Substitution IV	0.099	0	1.00	0	-0.15	2007	0
Material Substitution V	0.132	0	1.50	0	-0.20	2017	0
Drag Reduction II	0.023	32	0.00	0	0.00	1985	0
Drag Reduction III	0.046	64	0.00	0	0.05	1991	0
Drag Reduction IV	0.069	112	0.00	0	0.01	2004	0
Drag Reduction V	0.092	176	0.00	0	0.02	2014	0
TCLU	0.030	40	0.00	0	0.00	1980	0
4-Speed Automatic	0.045	225	0.00	30	0.00	1980	0.05
5-Speed Automatic	0.065	325	0.00	40	0.00	1995	0.07
CVT	0.100	250	0.00	20	0.00	1995	0.07
6-Speed Manual	0.020	100	0.00	30	0.00	1991	0.05
Electronic Transmission I	0.005	20	0.00	5	0.00	1988	0
Electronic Transmission II	0.015	40	0.00	5	0.00	1998	0
Roller Cam	0.020	16	0.00	0	0.00	1987	0
OHC 4	0.030	100	0.00	0	0.00	1980	0.2
OHC 6	0.030	140	0.00	0	0.00	1980	0.2
OHC 8	0.030	170	0.00	0	0.00	1980	0.2
4C/4V	0.090	240	0.00	30	0.00	1988	0.45
6C/4V	0.080	320	0.00	45	0.00	1991	0.45
8C/4V	0.080	400	0.00	60	0.00	1991	0.45
Cylinder Reduction	0.030	-100	0.00	-150	0.00	1988	-0.1
4C/5V	0.100	300	0.00	45	0.00	1998	0.55
Turbo	0.050	800	0.00	80	0.00	1980	0.45
Engine Friction Reduction I	0.020	20	0.00	0	0.00	1987	0
Engine Friction Reduction II	0.035	50	0.00	0	0.00	1996	0
Engine Friction Reduction III	0.050	90	0.00	0	0.00	2006	0
Engine Friction Reduction IV	0.065	140	0.00	0	0.00	2016	0
VVT I	0.080	140	0.00	40	0.00	1998	0.1
VVT II	0.100	180	0.00	40	0.00	2008	0.15

Lean Burn	0.100	150	0.00	0	0.00	2012	0
Two Stroke	0.150	150	0.00	-150	0.00	2004	0
TBI	0.020	40	0.00	0	0.00	1982	0.05
MPI	0.035	80	0.00	0	0.00	1987	0.1
Air Pump	0.010	0	0.00	-10	0.00	1982	0
DFS	0.015	15	0.00	0	0.00	1987	0.1
Oil 5W-30	0.005	2	0.00	0	0.00	1987	0
Oil Synthetic	0.015	5	0.00	0	0.00	1997	0
Tires I	0.010	16	0.00	0	0.00	1992	0
Tires II	0.020	32	0.00	0	0.00	2002	0
Tires III	0.030	48	0.00	0	0.00	2012	0
Tires IV	0.040	64	0.00	0	0.00	2018	0
ACC I	0.005	15	0.00	0	0.00	1992	0
ACC II	0.010	30	0.00	0	0.00	1997	0
EPS	0.015	40	0.00	0	0.00	2002	0
4WD Improvements	0.030	100	0.00	0	-0.05	2002	0
Air Bags	-0.010	300	0.00	35	0.00	1987	0
Emissions Tier I	-0.010	150	0.00	10	0.00	1994	0
Emissions Tier II	-0.010	300	0.00	20	0.00	2003	0
ABS	-0.005	300	0.00	10	0.00	1987	0
Side Impact	-0.005	100	0.00	20	0.00	1996	0
Roof Crush	-0.003	100	0.00	5	0.00	2001	0
Increased Size/Wt.	-0.133	0	0.00	0	0.05	1991	0
GDI/4C	0.170	1000	0	0	0.00	2005	0
GDI/6C	0.170	1200	0	0	0.00	2005	0
Gasoline Elec Hybrid	0.450	0	75.00	0	0.05	2001	0

STANDARD TECHNOLOGY MATRIX FOR TRUCKS

	Fractional fuel efficiency change	Incremental cost (1990 \$)	Incremental cost (\$/Unit Wt.)	Incremental weight (Lbs.)	Incremental weight (Lbs./Unit Wt.)	Fiscal year introduced	Fractional horsepower change
Front Wheel Drive	0.020	160	0.00	0	-0.08	1985	0
Unit Body	0.060	80	0.00	0	-0.05	1995	0
Material Substitution II	0.033	0	0.60	0	-0.05	1996	0
Material Substitution III	0.066	0	0.90	0	-0.10	2006	0
Material Substitution IV	0.099	0	1.00	0	-0.15	2016	0
Material Substitution V	0.132	0	1.50	0	-0.20	2026	0
Drag Reduction II	0.023	32	0.00	0	0.00	1990	0
Drag Reduction III	0.046	64	0.00	0	0.05	1997	0
Drag Reduction IV	0.069	112	0.00	0	0.01	2007	0
Drag Reduction V	0.092	176	0.00	0	0.02	2017	0
TCLU	0.030	40	0.00	0	0.00	1980	0
4-Speed Automatic	0.045	225	0.00	30	0.00	1980	0.05
5-Speed Automatic	0.065	325	0.00	40	0.00	1997	0.07
CVT	0.100	250	0.00	20	0.00	2005	0.07
6-Speed Manual	0.020	100	0.00	30	0.00	1997	0.05
Electronic Transmission I	0.005	20	0.00	5	0.00	1991	0
Electronic Transmission II	0.015	40	0.00	5	0.00	2006	0
Roller Cam	0.020	16	0.00	0	0.00	1986	0
OHC 4	0.030	100	0.00	0	0.00	1990	0.15
OHC 6	0.030	140	0.00	0	0.00	1985	0.15
OHC 8	0.030	170	0.00	0	0.00	1995	0.15
4C/4V	0.060	240	0.00	30	0.00	1990	0.30
6C/4V	0.060	320	0.00	45	0.00	1990	0.30
8C/4V	0.060	400	0.00	60	0.00	2002	0.30
Cylinder Reduction	0.030	-100	0.00	-150	0.00	1990	-0.1
4C/5V	0.080	300	0.00	45	0.00	1997	0.55
Turbo	0.050	800	0.00	80	0.00	1980	0.45
Engine Friction Reduction I	0.020	20	0.00	0	0.00	1991	0
Engine Friction Reduction II	0.035	50	0.00	0	0.00	2002	0
Engine Friction Reduction III	0.050	90	0.00	0	0.00	2012	0
Engine Friction Reduction IV	0.065	140	0.00	0	0.00	2022	0
VVT I	0.080	140	0.00	40	0.00	2006	0.1
VVT II	0.100	180	0.00	40	0.00	2016	0.15

Lean Burn	0.100	150	0.00	0	0.0	2018	0
Two Stroke	0.150	150	0.00	-150	0.00	2008	0
TBI	0.020	40	0.00	0	0.00	1985	0.05
MPI	0.035	80	0.00	0	0.00	1985	0.1
Air Pump	0.010	0	0.00	-10	0.00	1985	0
DFS	0.015	15	0.00	0	0.00	1985	0.1
Oil %w-30	0.005	2	0.00	0	0.00	1987	0
Oil Synthetic	0.015	5	0.00	0	0.00	1997	0
Tires I	0.010	16	0.00	0	0.00	1992	0
Tires II	0.020	32	0.00	0	0.00	2002	0
Tires III	0.030	48	0.00	0	0.00	2012	0
Tires IV	0.040	64	0.00	0	0.00	2018	0
ACC I	0.005	15	0.00	0	0.00	1997	0
ACC II	0.010	30	0.00	0	0.00	2007	0
EPS	0.015	40	0.00	0	0.00	2002	0
4WD Improvements	0.030	100	0.00	0	-0.05	2002	0
Air Bags	-0.010	300	0.00	35	0.00	1992	0
Emissions Tier I	-0.010	150	0.00	10	0.00	1996	0
Emissions Tier II	-0.010	300	0.00	20	0.00	2004	0
ABS	-0.005	300	0.00	10	0.00	1990	0
Side Impact	-0.005	100	0.00	20	0.00	1996	0
Roof Crush	-0.003	100	0.00	5	0.00	2001	0
Increased Size/Wt.	-0.200	0	0.00	0	0.05	1991	0
GDI/4C	0.170	1000	0.00	0	0.00	2005	0
GDI/6C	0.170	1200	0.00	0	0.00	2005	0
Gasoline Elec Hybrid	0.450	0	75.00	0	0.05	2001	0

TRANSPORTATION—ALTERNATIVE-FUEL VEHICLE

The alternative-fuel technology choice model utilizes a discrete choice specification, which uses vehicle attributes as inputs, and forecasts market shares of each of the following sixteen light-duty technologies:

- | | |
|---------------------------|---------------------------------------|
| 1. Methanol Flex | 9. CNG bi-fuel |
| 2. Methanol | 10. LPG bi-fuel |
| 3. Ethanol Flex | 11. Fuel Cell Methanol |
| 4. Ethanol | 12. Fuel Cell Hydrogen |
| 5. CNG | 13. Fuel Cell Gasoline |
| 6. LPG | 14. Gas-Electric Hybrid |
| 7. Electric | 15. Turbo Direct-Injection Diesel ICE |
| 8. Electric-Diesel Hybrid | 16. Gasoline ICE |

TRANSPORTATION—AIR

Proposed technology	Year of introduction	Jet fuel price necessary for cost-effectiveness (87\$/gallon)	Seat-miles per gallon (SMPG) Gain over 1990 levels	
			Narrow body	Wide body
Engines				
Ultra-high bypass	1995	\$0.56	10%	10%
Propfan	2000	\$1.36	23%	0%
Thermodynamics	2010	\$1.22	20%	
Aerodynamics				
Hybrid laminar flow	2020	\$1.53	15%	15%
Advanced aerodynamics	2000	\$1.70	18%	18%
Other				
Weight reducing materials	2000	15%	15%

TRANSPORTATION—FREIGHT TRUCKS

	Fuel economy improvement (%)		Maximum penetration (%)		Introduction year	Fuel trigger price (1987 per MMBtu)
	Medium	Large	Medium	Large		
Existing technologies						
Aerodynamic features	5	13	40	100	n/a	\$8.00
Radial tires	4	1	90	100	n/a	\$8.00
Axle or drive ratio to maximize fuel economy	6	10	50	100	n/a	\$8.00
Fuel economy engine with low RPM, turbo change, etc	7	9	80	100	n/a	\$8.00
Variable fan drive	3	5	40	100	n/a	\$8.00
New technologies						
Improved tires & lubricants	5	5	100	100	1994	\$10.72
Electronic engine controls	4	4	70	98	1994	\$8.94
Electronic transmission controls	1	1	75	98	1994	\$28.60
Advanced drag reduction	16	15	40	40	1997	\$2.40
Turbocompound diesel engine ..	10	10	75	90	2010	\$7.15
Heat engine-LE	17	17	100	100	9999	\$99.10

RESIDENTIAL END-USE TECHNOLOGY MENU FOR 2010

The table below shows the assumed range of efficiency and cost (\$1998) for technologies included in the AE099 reference case for the year 2010.¹ Cost declines and performance enhancements are assumed to occur over time, as consumer adoption and technological innovation spur additional market penetration for more efficient equipment. The cost and efficiency ranges represent the least and most efficient technologies available for purchase in the year 2010, with the corresponding range of installed costs.

Technology	Efficiency measure	Efficiency range	Cost range
Air-source heat pump	SEER	10.0-18.0	\$4100-\$5543
Ground-source heat pump	EER	113.5-21.0	\$7650-\$10,800
Natural gas heat pump	SEER	15.6	\$7500
Natural gas furnace	AFUE	78-96	\$1300-\$1650
Central air conditioner	SEER	10.0-18.0	\$2500-\$3300
Room air conditioner	EER	9.7-12.0	\$450-\$760
Natural gas water heater	EF	.54-.86	\$340-\$2000
Electric water heater	EF	.86-2.0	\$350-\$900
Dishwasher	MEF	.46-.71	\$350-\$600
Clothes washer	MEF	.82-1.6	\$490-\$800
Refrigerator	Kilowatthours/ year	478-400	\$530-\$700
Freezer	Kilowatthours/ year	394-302	\$381-\$500
Lighting	Lumens/Watt	18-51	\$0.55-\$15.42
Torchiere Lighting	Watts	300-78	\$10.00-\$44.00
Building shell	N/A	Current average to 50% better than MEC95	N/A

COMMERCIAL END-USE TECHNOLOGY MENU FOR 2010

The table below shows the assumed range of efficiency and cost (\$1998) for technologies included in the AE099 reference case for the year 2010.² Improvements in technology cost and performance we assumed to occur over time, as consumer adoption and technological innovation spur additional market penetration for more efficient equipment. The cost and efficiency ranges represent the least and most efficient technologies available for purchase in the year 2010, with the corresponding range of installed costs.

¹The technology menu for the EIA analysis of the Administration's tax credit proposals also included representations of solar photovoltaic systems at about \$4,930 per kilowatt by 2010 and fuel cells at \$2,425 per kilowatt by 2010.

²The technology menu for the EIA analysis of the Administration's tax credit proposals also included representations of solar photovoltaic systems at about \$4,930 per kilowatt by 2010 and fuel cells at \$2,425 per kilowatt by 2010.

Technology	Efficiency measure	Efficiency range	Cost range
Electric chiller	COP	2.5-7.3	\$525-\$950 per ton cooling
Gas-fired chiller	COP	1.0-2.1	\$590-\$1300 per ton cooling
Air-source heat pump	SEER	10-18	\$4100-\$5400 per unit
Ground-source heat pump	EER	13.5-21	\$7,000-\$10,800 per unit
Natural gas heat pump	Cooling COP	0.7-4.1	\$6,000-\$8,500 per unit
Gas-fired furnaces	AFUE	80-92	\$12.50-\$15.09/1000 Btu out
Gas-fired boilers	Efficiency (%)	80-90	\$10.53-\$12.98/1000 Btu out
Oil-fired boilers	Efficiency (%)	83-87	\$16.51-\$22.33/1000 Btu
Gas-fired water heaters	Thermal efficiency (%)	80-96	\$18.00-\$25.82/1000 Btu
Electric water heaters	COP	0.93-2.5	\$21.70-\$189.29/1000 Btu
Solar water heater		Meets 50% of load	\$2,600-\$3,600 for 40 ft ² system
Constant air volume ventilation.	CFM/Btu	Sm. 0.59-0.63 Lg. 0.32-0.36	\$2,898-\$3,433/1000 CFM \$3,628-\$4,446/1000 CFM
Variable air volume ventilation.	CFM/Btu	Sm. 0.27-0.56 Lg. 0.32-0.6	\$2,863-\$3,295/1000 CFM \$3,453-\$3,795/1000 CFM
Incandescent system	Lumens/watt	15.6	\$46/1000 lumens
Compact fluorescent	Lumens/watt	53.7-66.7	\$51.24-\$77.71/1000 lumens
Halogen	Lumens/watt	18.1-20.9	\$51.26/1000 lumens
Advanced incandescent	Lumens/watt	30.3-47.9	\$48.81-\$49.78/1000 lumens
Fluorescent system	Lumens/watt	64.4-120.3*	\$30.43-\$37.28/1000 lumens
Advanced fluorescent	Lumens/watt	123	\$37.60/1000 lumens
High intensity discharge ..	Lumens/watt	40.2-89.7	\$16.00-\$31.87/1000 lumens
Sulfur lighting	Lumens/watt	100	\$14.01/1000 lumens
Refrigeration systems	COP	1.2-1.88	\$219.56-\$301.11/1000 Btu/hr service provided

* Units for efficiency measures are as follows: COP, Coefficient of Performance; SEER, Seasonal Energy Efficiency Rating; EER, Energy Efficiency Rating; AFUE, Annual Fuel Utilization Efficiency; CFM/Btu, Cubic Feet per Minute of ventilation air provided over British Thermal Units used.

INDUSTRIAL TECHNOLOGY REPRESENTATION

The industrial model uses “technology bundles” to characterize technical change in the energy-intensive industries rather than representing individual technologies due to limited data availability and the heterogeneity of industries and equipment. These bundles are defined for each production process step for five industries and for end use in two industries. The process step industries are paper, glass, cement, steel, and aluminum. The end use industries are food and chemicals. The unit energy consumption is defined as the energy use per ton of throughput at a process step or as energy use per dollar of output for the end use industries. The table below gives the assumed ratio of 2020 energy intensity to 1994 energy intensity for existing industrial plants. The table gives similar relative energy intensities (REIs) for new facilities in 1994 and for new plants in 2020. Projected equipment retirement

rates are also in the table. The technologies considered in arriving at these REIs are given in the following table. The estimated rate at which the average intensity declines is determined by the rate and timing of new additions to capacity. The estimated rate and timing of new additions are a function of estimated retirement rates and industry growth rates. If energy prices are projected to increase substantially, the minimum REI is assumed to be reached earlier than 2020. Also, in this situation, assumed retirement rates are increased from their baseline levels.

RELATIVE ENERGY INTENSITIES AND RETIREMENT RATES FOR
INDUSTRIAL FACILITIES

Industry/process unit	Old facilities		New facilities		Retirement rate
	REI 2020	REI 1994	REI 2020	REI 2020	
Food					
Direct fuel	0.897	0.90	0.80		1.7
Flot water/steam	0.922	0.90	0.80		1.7
Refrigeration	0.947	0.90	0.80		1.7
Other electric	0.947	0.90	0.80		1.7
Pulp & Paper					
Wood preparation	0.950	0.840	0.831		2.3
Waste pulping	0.974	0.930	0.885		2.3
Mechanical pulping	0.944	0.840	0.822		2.3
Semi-chemical	0.894	0.730	0.697		2.3
Kraft, sulfite	0.903	0.730	0.600		2.3
Bleaching	0.910	0.750	0.683		2.3
Paper making	0.910	0.750	0.560		2.3
Bulk Chemicals					
Direct fuel	0.897	0.90	0.80		1.9
Flot water/steam	0.922	0.90	0.80		1.9
Electrolytic	0.980	0.90	0.80		1.9
Other electric	0.947	0.90	0.80		1.9
Glass¹					
Batch preparation	0.957	0.882	0.882		1.3
Melting/refining	0.892	0.850	0.448		1.3
Forming	0.952	0.818	0.744		1.3
Post forming	0.921	0.780	0.760		1.3
Cement					
Dry process	0.982	0.790	0.657		1.2
Wet processing	0.954	NA	NA		1.2
Finish grinding	0.943	0.813	0.641		1.2
Steel					
Coke oven ²	1.00	0.840	0.817		1.5
BF/basic oxygen furnace	1.00	1.00	0.982		1.0
Electric arc furnace	1.00	0.960	0.960		1.5
Ingot casting ²	1.00	NA	NA		2.9
Continuous casting	1.00	1.00	1.00		2.9
Hot rolling	0.698	0.500	0.401		2.9
Cold rolling	0.877	0.840	0.488		2.9
Aluminum					
Primary aluminum	0.936	0.910	0.812		2.1
Semi-fabrication	0.855	0.610	0.506		2.1

¹ REIs apply to both virgin and recycled materials.

² No new plants are likely to be built that use these technologies.

Source: Energy Information Administration, *Model Documentation Report Industrial Sector Demand Module of the National Energy Modeling System*, DOE/EIA-MO64 (99) (Washington, DC, January 1999), Table C12.

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED

Sector	Major process step	Technology
Pulp/Paper (S-0-A)	Wood Preparation	Whole Tree Debarking/Chipping *
		Chip Screening Equipment *
Pulp/Paper (S-0-A)	Chemical Pulping Technologies (Kraft, Sulfitite)	Continuous Digesters
		Batch Digesters
		Radar Displacement Heating
		Sunds Defibrator Cold Blow and Extended Delignification
		EKONO's White Liquor Impregnation
		Anthraquinone Pulping
		Alkaline Sulfitite Anthraquinone (ASOQ) and Neutral Sulfitite Anthraquinone (NSAQ) Pulping
		Tampella Recovery System
		Advanced Black Liquor Evaporator
		Process Controls System
Pulp/Paper (S-0-A)	Mechanical and Semi—mechanical technologies	Pressurized Groundwood (PGW)
		PGW-Plus
		Thermo-Refiner Mechanical Pulping
		Heat Recovery in TMP *
		Cyclotherm System for Heat Recovery *
		Chemimechanical Pulping
		Chemi-Thermomechanical Pulping (CTMP)
		Process Control System
Pulp/Paper (S-0-A)	Semi-Chemical Technologies	See Chemical and Mechanical S-0-A technologies above
Pulp/Paper (S-0-A)	Waste Paper Pulping Technologies	Advanced Pulping
		Advanced Deinking
Pulp/Paper (S-0-A)	Bleaching Oxygen Predelignification Technologies	Oxygen Bleaching
		Displacement Bleaching
		Bio-bleaching
Pulp/Paper (S-0-A)	Papermaking Technologies	Extended Nip Press *

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
		Hot Pressing
		IR Moisture Profiling*
		Reduced Air Requirement*
		Wage Heat Recovery*
		Process Control System*
Pulp/Paper (Adv Tech)	Wood Preparation	Total savings over average S-0-A technologies are foreseen to be modest. Most of the energy savings that can be achieved in the future are in the use of computer control, more efficient electric motors/drives, etc. We assumed REIs to decrease by 0.5% per year.
Pulp/Paper (Adv Tech)	Chemical (Kraft/Sulfite) Technologies	
		Non-Sulfur Chemimechanical, (NSCM) Pulping
		Advanced Alcohol Pulping
		Biological Pulping
		Ontario Paper Co. (OPCO) Process
		Black Liquor Concentration*
		Black Liquor Heat Recovery
		Black Liquor Gasification*
Pulp/Paper (Adv Tech)	Mechanical Technologies	
		Advanced-Chemical/Thermal Treatment
		Non-Sulfur Chemimechanical (NSCM)
		OPCO Process
Pulp/Paper (Adv Tech)	Semi-Chemical Technologies	Technology Introduction:
		OPCO Process
		NSCM Process
		Waste Pulping—Improvements in steam use, computer control, etc., assumed to decrease REI by 0.2% per year.
Pulp/Paper (Adv Tech)	Bleaching Technologies	Technology Introduction:
		Ozone Bleaching
		N02/02 Bleaching
		Biobleaching

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
Pulp/Paper (Adv Tech)	Papermaking Technologies	Technology Introduction: 2005-2015
		High-Consistency Forming*
		Advances in Wet Pressing*
		Press Drying*
		Impulse Drying*
		Air Radio-Frequency-Assisted (ARFA) Drying*
Glass (S-O-A)	Batch Preparation Technologies	Computerized Weighing, Mixing, and Charging
Glass (S-O-A)	Melting/Refining Technologies	
		Chemical Boosting
		Oxygen Enriched Combustion Air*
		Automatic Tap Charging Transformers for Electric Melters
		Sealed-in Burner Systems*
		Dual-Depth Melter
		Chimney Block Regenerator Refractories
		Reduction of Regenerator Air Leakage*
		Recuperative Burners*
Glass (S-O-A)	Forming/Post-Forming Technologies	Emhart Type 540 Forehearth
		Forehearth High-Pressure Gas Firing System
		Lightweighting
Glass (Advanced)	Batch Preparation Technologies	No advanced technologies identified
Glass (Advanced)	Melting/Refining Technologies	Technology Introduction: 1995-2010
		Direct Coal Firing
		Submerged Burner Combustion
		Coal-Fired Hot Gas Generation*
		Advanced Glass Melter
		Batch Liquefaction
		Molybdenum-Lined Electric Melter
		Ultrasonic Bath Agitation/Refining*

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
		Excess Heat Extraction from Regenerators
		Thermochemical Recuperator
		Sol-Gel Process
		Furnace Insulation Materials *
		Pressure Swing Adsorption Oxygen Generator *
		Hollow Fiber Membrane Air Separation Process *
Glass (Advanced)	Forming/Post-Forming Technologies	Technology Introduction: 1995-2010
		Mold Design *
		Mold Cooling Systems
		Automatic Gob Control
		Improved Glass Strengthening Techniques *
		Improved Protective Coatings *
Cement (S-O-A)	Dry Process Technologies	Roller Mills *
		High-Efficiency Classifiers *
		Grinding Media and Mill Linings *
		Waste Heat Drying *
		Kiln Feed Slurry Dewatering *
		Dry-Preheater/Precalciner Kilns
		Kiln Radiation and Infiltration Losses *
		Kiln Internal Efficiency Enhancement *
		Waste Fuels *
		Controlled Particle Size Distribution Cement
		High-Pressure Roller Press
		Finish Mill Internals, Configuration, and Operation
		Grinding Aids *
Cement (S-O-A)	Imports-Finish Grinding Technologies	High-Efficiency Classifiers *
		Controlled Particle Size Distribution Cement *
		High Pressure Roller Press
		Roller Mills *
		Finish Mill Internals, Configuration, and Operations
		Grinding Aids *

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
Cement (Advanced)	Dry Process Technologies	Technology Introduction: 1997-2013
		Autogenous Mills
		Differential Grinding
		Sensors and Controls *
		Fluidized-Bed Drying
		Stationary Clinkering System
		All-Electric Kilns
		Sensors for On-Line Analysis *
		Advanced Kiln Control *
		Catalyzed, Low-Temperature Calcination
		Alkali Specification Modification *
		Cone Crushers *
		Advanced (Non-Mechanical) Comminution
		Modifying Fineness Specifications *
		Blended Cements *
Advanced Waste Combustion		
Cement (Advanced)	Imports-Finish Grinding	Sensors and Controls *
		Cone Crushers *
		Advanced (Non-Mechanical) Comminution
		Modifying Fineness Specifications *
		Blended Cements *
I&S (S-O-A)	Cokemaking Technologies	Dry Quenching of Coke *
		Carbonization Control
		Programmed Heating
		Wet Quenching of Coke with Energy Recovery *
		Sensible Heat Recovery of Off-Gases *
I&S (S-O-A)	Ironmaking Technologies	Blast Furnace
		Coal Injection *
		Water-Cooling
		Movable Throat Armor *

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
		Top Pressure Recovery *
		Hot Stove Waste Heat Recovery *
		Insulation of Cold Blast Main *
		Recovery of BF Gas Released During Charging
		Slag Waste Heat Recovery *
		Paul Wurth Top *
		External Desulfurization— injection of calcium carbide or mag-coke as a desulfurizing reagent *
		Midrex/HBI
I&S (S-O-A)	Steelmaking Technologies	Basic Oxygen Furnace
		Gas Recovery in Combination with Sensible Heat Recovery *
		Two working vessels concept *
		Combined Top and Bottom Oxygen Blowing *
		In-Process Control (Dynamic) of Temp and Carbon Content *
		Electric Arc Furnace
		DC Arc Furnaces *
		Ultra-High Power (UBP) *
		Computerization *
		Bottom Tap Vessels *
		Water-Cooled Furnace Panels and Top *
		Water-Cooled Electrode Sections *
		Oxy-Fuel Burners *
		Long Arc Foamy Slag Practice *
		Material Handling Practices *
		Induction Furnaces *
		Energy Optimizing Furnaces *
		Scrap-Preheating *
		Ladle Drying and Preheating *
		Injection Steelmaking (ladle metallurgy)

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
		Vacuum Arc Decarburization *
		Argon Stirring
		Specialty Steelmaking Processes
		Electroslag Remelting (ESR) *
		Argon-Oxygen Decarburization (AOD)
		Vacuum Induction Melting (VIM) *
		Electron Beam Melting (EBM) *
		Vacuum Arc Remelting (VAR) *
I&S (S-O-A)	Steelcasting Technologies	Modern Casters *
		Thin Slab Casting
		Slab Heat Recovery *
		Soaking Pit Utilization and Pit Vacant Time *
I&S (S-O-A)	Steelforming (Rolling) Technologies	Hot Charging
		Preheating Furnaces
		Improved Insulation *
		Waste Heat Recovery and Air Preheating *
		Waste Heat Recovery and Fuel Gas Preheating *
		Increased Length of the Preheating Furnace
		Waste Heat Boilers
		Evaporative Cooling of Furnace Skids
		Direct Rolling
		Leveling Furnace *
		The Coil Box *
		Covered Delay Table *
		Pickling—Insulated Floats *
		Annealing
		Air Preheating *
		Fuel Gas Preheating
		Combustion Control *

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
		Continuous Annealing
		Continuous Cold Rolling
I&S (Advanced Tech- nologies)	Ironmaking Technologies	PLASMARED
		COREX
		Direct Iron Ore Smelting (AISI)
		HiSmelt
		Fastmet
		Iron Carbide Route
		Iron Ore Reduction/Steelmaking (AISI)
I&S (Advanced Tech- nologies)	Direct Steelmaking Tech- nologies	PLASMAMELT
		INRED
		ELRED
		Foster Wheeler-Tetronics Expanded Processive Plasm Process
I&S (Advanced Tech- nologies)	Steelmaking Technologies	Scrap Preheating*
		Energy Optimizing Furnace (EOF)
		Modern Electric Arc Furnace with Continuous Charging/Scrap Preheating
		Modern Basic Oxygen Furnace
		Injection of Carbonaceous Fuels
		Increased Scrap Use
		Ladle Drying and Preheating*
Injection Steelmaking		

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
I&S (Advanced Tech- nologies)	Steelcasting Technologies	Horizontal Continuous Caster *
		Near Net Shapecasting *
		Direct Strip Casting *
		Ultra Thin Strip Casting *
		Spray Casting
I&S (Advanced Tech- nologies)	Hot/Cold Rolling	Direct Rolling
		Continuous Cold Rolling and Finishing
		In-Line Melting/Rolling
		Advanced Coating
Aluminum (S-O-A)	Alumina Refining Tech- nologies	Advanced Digesters
		Heat Recovery *
Aluminum (S-O-A)	Primary Aluminum Tech- nologies	Advanced Cells
		New Cathodes *
Aluminum (S-O-A)	Semi-Fabrication Tech- nologies	Continuous-Strip Casting
		Electromagnetic Casting
Aluminum (S-O-A)	Secondary Aluminum Technologies	Induction Melting
		Advanced Melting
Aluminum (Advanced)	Alumina Refining Tech- nologies	Retrofit of S-O-A Technologies
Aluminum (Advanced)	Primary Aluminum Tech- nologies	Technology Introduction:
		Carbothermic Reduction
		Inert Anodes *
		Bipolar Cell Technology

ADVANCED AND STATE-OF-THE-ART INDUSTRIAL TECHNOLOGIES
INCLUDED—Continued

Sector	Major process step	Technology
		Wettable Cathodes *
Aluminum (Advanced)	Semi-Fabrication Tech- nologies	Technology Introduction
		New Melting Technology *
		Preheaters *
Aluminum (Advanced)	Secondary Aluminum Technologies	Technology Introduction
		New Melting Technology (submerged radiant burn- ers)
		Preheaters *
		Heat Recovery Technology
TOTAL		

Note: Many advanced technologies are more energy intensive than their predecessors. Thus, it is expected that these new technologies will not fully replace the old ones, but rather provide enhancement, particularly for high quality steels. Other advantages include accelerated reaction rates, reduced reactor volume and residence time, lower capital investment, and higher scrap use. A discussion of relative energy intensities for new iron/steelmaking technologies is found in Appendix M of the 1993 report to DAC/EIA.

Source: Energy Information Administration, *Model Documentation Report. Industrial Sector Demand Module of the National Energy Modeling System*, DOE/EIA-M064 (99) (Washington, DC, January 1999), Table C13.

Question 6a. In his testimony, Jerry Taylor argues that market barriers to the introduction of new technologies are typically not “market failures” but market efficiencies. To illustrate his point, Mr. Taylor, using EIA data, calculates that consumers would have to spend an additional \$1,100 to purchase the CCTI-approved high-efficiency heat pump but would save only \$783 in electricity costs during the equipment’s 11-year operating life. He comments: “At the very least, spending \$1,100 to save \$783 hardly represents a net plus for the economy.”

Does EIA concur that consumer reluctance to purchase the most energy-efficient heat pump may be rational behavior and, therefore, an example of market efficiency rather than market failure?

Answer. If the service provided by one appliance differs from another appliance only in the cost of the unit and the energy saved, and if there are no other differences in externality costs, then we agree, with, Mr. Taylor’s assertion—the additional \$1,100 for a high efficiency heat pump that would save only \$783 over its expected life would represent a market efficiency, not a market failure. The simple comparison of projected energy savings to initial cost generally does not completely explain consumer behavior. More efficient heat pumps or appliances are often not purchased even when they could deliver net cost savings over the useful life of the product. Buyers often try to minimize first costs, without regard to life cycle costs. This is especially true of builders, contractors, and other buyers who are not the ultimate consumers of the services from the appliance. In addition, consumers often lack the appropriate information to consider the tradeoffs between first costs and operating costs, as well as the many other factors which affect their choice. End-use consumers typically make decisions based on multiple criteria of which price is one factor. Familiarity with the product, its operation, and its reliability; the ease, cost and frequency of repairs; and the product’s market availability are important factors in consumer appliance and automotive choices. For automobile purchases, for example, performance, size, range, and cargo space tend to be valued highly as the growing share of sport utility vehicles indicates. Information programs may help improve familiarity, availability and ease of use of new technologies and consequently could facilitate their adoption. Also, some consumers may be environmentally oriented and willing to pay more for a cleaner environment.

Question 6b. For each technology targeted by the CCTI tax credits, please describe any current barriers to private sector use, including any regulatory barriers. In EIA's judgment, are the non-regulatory barriers "market failures" or just facts of economic life?

Answer. Market failures in the economic literature relate to imperfections in the operation of the market. Such imperfections are typically related to (a) imperfect information availability or its communication to market participants, (b) distortions in market price signals that may be caused by regulations, laws, and other government policies, (c) the inability of the market to correctly price market externalities, and (d) the principal/agent problem, where the cost and benefit to the user of a good is not directly considered by the party making the investment decision. For example, a builder of a new house may only be interested in the upfront cost of the new equipment and not the savings in the utility bills to the ultimate homeowner since lower initial investment in appliances keeps the overall price of the home lower.

Distortions in prices may arise when average cost pricing is used instead of marginal cost pricing for natural gas and electricity. In these cases, the consumer price does not equal the price to society of the resource. Uninternalized environmental externality costs from fossil energy, nuclear, and hydroelectric power represent other possible sources of consumer prices that may not reflect social costs. Governmental subsidies such as tax subsidies for fossil fuel and ethanol production are another example.

Market barriers that are not market failures are often believed to represent internalized costs that are used by an efficient economy to optimally allocate resources. Such barriers help explain why the diffusion of energy conservation technologies is gradual. They include:

- *The cost of private information, acquisition and absorption.* It is not costless to learn how a specific technological improvement fits into one's home or firm nor is it costless to learn about reliable suppliers of new products. Thus, the purchase price of a new product is a lower bound to the true cost.
- *High implicit discount rates.* Discount rates may be higher than just the financial rate because investments in energy technologies may be perceived as irreversible and uncertainty exists regarding the payback. Because future energy prices are not known with certainty, the life-cycle savings can only be estimated by the party making the investment.
- *The heterogeneous market.* A given technology could be profitable on average and still not be profitable for every single consumer.
- *The wait and see phenomenon.* For example, if purchase or installation costs of specific technologies are falling (e.g., desktop computers), the consumer may want to wait to purchase the product, despite the fact that the current net benefits of adopting the technology may be positive, because future net benefits are expected to be even greater.

It is not unusual for new technologies to face considerable challenges when trying to break into a market where more established technologies dominate. The developers must overcome engineering hurdles associated with the new technology, find financial backers to support its initial commercialization, develop distribution channels for getting it to the market, encourage potential customers to try it, and prove that the technology's actual field performance lives up to its advance expectations. Each of these steps can take considerable time and effort, even for technologies that initially look economically attractive.

In addition, new technologies are likely to face a market structure—including pricing, safety, siting, and environmental rules and regulations—that have evolved around the relatively mature technologies that currently dominate. These rules and regulations may slow a new product's initial penetration into the market, but if the economics of a technology are sufficiently attractive, efforts to modify these rules are likely to arise.

In the electricity sector, it is often argued that the current market favors large, central station generating facilities. Existing interconnection, air permitting and taxation rules are often cited as impediments to newer, small scale, distributed power facilities. While these rules and regulations may need review, it is unclear to what degree they may be slowing new technology development.

The Administration's CCTI proposal attempts, to induce "learning-by-doing" and "learning-by-using" for advanced technologies, a phenomenon that is well-documented in the economic literature. Manufacturing costs decline with manufacturing experience and familiarity with the use of a product makes that product more likely to be adopted. As such, the CCTI can be viewed as an attempt to improve technology information and increase manufacturing productivity and thereby accelerate technology penetration of environmentally-friendly technologies. However, our analysis concludes that the time period during which the tax incentives are available

is too short and the incentives too small to have a significant impact on technology learning.

As the answer to question 3 indicates, in almost all instances except for biomass cofiring, energy efficient residential equipment, and the energy efficient homes program we estimate that most adopters would have purchased the technology without the added tax incentives. In the energy efficient homes program and the residential energy efficient equipment program, the incentives were estimated to be somewhat effective in increasing adoption of more efficient homes and residential technologies during the duration of the incentives. However, the duration and magnitude of sales of the new technologies were estimated to be too small to have a lasting impact on either manufacturer or consumer behavior. The primary barrier to the penetration of most CCTI technologies is the current and expected future price of the technologies compared to the alternatives (competition). Competition from cheaper technologies is perhaps the most significant barrier to adoption and relates to the price barrier indicated earlier. While most programs assume their technologies improve, they have typically neglected the fact that other existing technologies will also improve, making it harder to capture or dominate the market. While innovative and aggressive marketing strategies by private firms and government information programs could enhance the effectiveness of tax incentives by increasing exposure and consumer awareness of a given technology, the short lead times and the limited duration of the proposed incentives make permanent changes in consumer and producer behavior unlikely in EIA's view.

In many cases, while the technologies are commercially available today they are not readily available from common or usual sources. For example, home supply stores and contractors may not supply or carry the heat pump water heater currently. The consumer must shop for a supplier and installer. Fuels cells are also not commonly carried or stocked in today's market. The lack of public information on where to buy the technology and how to integrate it in the home can be a barrier to adoption.

Some current rules and regulations may be slowing the penetration of technologies addressed by the CCTI, particularly in the electricity and industrial sectors. Current rules concerning technical interconnection requirements and the calculation of standby/backup charges may need review in light of the emergence of small scale distributed generation technologies (DG) (including cogeneration systems). Stranded cost recovery—since it reduces the costs that can be avoided by installing a DG—may be further slowing new technology penetration in the electricity sector. Also, environmental and utility regulations may impede additions to cogeneration. For example, site fuel consumption will typically increase with the addition of cogeneration in the industrial sector, increasing site emissions of various regulated effluents. While, central station emissions will decrease, current regulations do not recognize the reduction in emissions that occur at other sites. Also, industrial companies would prefer to buy both steam and electricity from electric generating companies who are the experts in generating electricity, but the current regulated industry structure precludes it from happening.

Question 7. In general, do most advertising claims, whether by Federal agencies or private companies, regarding the commercial viability of figure technologies, prove to be overly cautious or overly optimistic? Please provide specific examples to illustrate your answer.

Answer. There is considerable evidence that many initial claims regarding the commercial viability of future technologies were optimistic, particularly regarding the technology's date of commercialization or its costs. However, there have also been some estimates that have fallen short of progress actually achieved and these illustrate the point that future technological developments are inherently unpredictable. The information available at the time of development may have suggested that the claims were plausible and only hindsight has proved them to be inaccurate. The estimates incorporate many assumptions about the economics and engineering success of overcoming technological hurdles and expectations regarding the cost and performance of competing technologies. There are many places where these expectations may go wrong.

Examples of technological optimism include:

- Early proponents of nuclear technology indicated that electricity generated from nuclear would be "too cheap to meter". Current cost estimates for new nuclear generated electricity exceed those of new coal plants and far exceed those of new gas combined cycle plants.
- Fusion generated electricity was projected in the late 1970s to be commercialized by 2000. Current estimates place commercialization beyond the 2020 horizon since a sustained controlled reaction that yields more energy than it consumes has yet to be achieved.

- Magneto-hydro-dynamics were expected to be commercialized by 2000. Significant material deformation problems remain to be solved before commercialization can be considered.
- Based on largely voluntary programs that include technological adoption and improvement to efficiency, it was projected that U.S. emissions of greenhouse gases in the year 2000 would return to their 1990 level.³ In 1997, carbon emissions, the main constituent of greenhouse gases, were 10.7 percent (145 million metric tons) higher than 1990. AE099, which incorporates EIA's estimates of CCAP's market impacts, projects year 2000 carbon emissions to rise 17.8 percent (239 million metric tons) above 1990 emissions levels.
- Oil shale technologies were expected to be competitive with conventional oil by 1995. Technological progress in the conventional production area reducing costs of finding and producing oil has kept oil shale technologies uncompetitive.
- Coal-based oil and gas synthetic fuels were expected to be cost effective and necessary to meet liquids demand by many forecasters and resulted in the development of the Synthetic Fuels Corporation. Funding for the Corporation has been eliminated and the program abandoned after construction of a single coal-gas plant in the Midwest. Technological progress in the conventional production of oil and natural gas has reduced the costs of finding and producing oil from these sources, making coal-based production uncompetitive.
- Cold fusion, the production of electricity using electrochemical reactions involving heavy water and electricity, was announced as a breakthrough but later discredited.
- It was expected that variable cylinder firing in autos would save transportation energy. Engineering design problems and apparent lack of market interest caused production to be canceled.
- On July 24, 1978, Energy Insider noted that an R&D goal was to develop photovoltaic systems by 1986 that would produce electricity for about \$1 per peak watt of installed capacity [in 1986 dollars], or six to eight cents per kilowatt hour. The costs for such systems achieved in 1986 were more than 4 times the target.
- It was reported in June 1980 that ocean thermal energy would be priced competitive with nuclear and coal by about 1990; ocean thermal today is not a cost-effective technology.

There are instances where technologies have come in at less cost than originally predicted. For example, EIA predicted in the late 1980's that the natural gas combined cycle technology would capture the future generating market, however, the life cycle costs were estimated at much higher levels than achieved today due to higher predicted capital costs, lower efficiencies, and higher predicted natural gas prices. In 1987, our analyses assumed that new combined-cycle plants would cost \$855 per kilowatt (\$1997) and operate at a 41 percent efficiency. In the 1999 AEO, a new conventional combined-cycle plant was estimated to cost only \$445 (\$1997) and operate at a 49 percent efficiency. Thus, the cost of new natural gas plants have dropped by 48 percent and their operating efficiency unproved by 20 percent compared to the assumptions used in earlier EIA projections. Also, advanced combined cycle units are expected to approach 55 percent efficiency in the near future.

Another example is the analysis of the Clean Air Act Amendments of 1990 where it was believed that coal-fired plants could not be retrofitted easily to use subbituminous, low-sulfur coal. This assumption was disproved after the legislation was enacted. Also, the costs of flue gas desulfurization equipment were overestimated. These two issues made the cost of a sulfur allowance much higher than actual costs achieved in the mid-1990s.

CONGRESS OF THE UNITED STATES,
Washington, DC, May 27, 1999.

Hon. CAROL M. BROWNER,
Administrator, Environmental Protection Agency, Washington, DC.

DEAR ADMINISTRATOR BROWNER: Thank you for providing an Environmental Protection Agency (EPA) witness at the joint hearing on May 20, 1999, entitled "Global Climate Change: The Administration's Compliance with Recent Statutory Requirements," before the Senate Subcommittee on Energy Research, Development, Production and Regulation and the House Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs. During the hearing, David M. Gardiner,

³ Climate Change Action Plan, Technical Supplement, DOE/PO-0011 (March 1994), p. 6

Assistant Administrator for Policy, who was the EPA witness, agreed to respond promptly to followup questions.

Please provide the information requested in this letter not later than June 18, 1999 to the Senate Subcommittee staff in Room 308 Dirksen Senate Office Building and the House Subcommittee staff in Room B-377 Rayburn House Office Building. If you have any questions, please contact Counsel Colleen Deegan at 224-8115 or Professional Staff Member Barbara Kahlow at 226-3058.

Thank you in advance for your attention to this request.

Sincerely,

DON NICKLES,
*Chairman, Subcommittee on Energy
Research Development, Production
and Regulation.*
DAVID M. MCINTOSH,
*Chairman, Subcommittee on Na-
tional Economic Growth, Natural
Resources and Regulatory Affairs.*

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF POLICY, PLANNING AND EVALUATION,
Washington, DC, June 23, 1999.

Hon. DON NICKLES,
*Chairman, Subcommittee on Energy Research, Development, Production and Regula-
tion, Committee on Energy and Natural Resources, U.S. Senate, Washington,
DC.*

DEAR MR. CHAIRMAN: Enclosed, for insertion in the hearing record, are the Environmental Protection Agency's (EPA) responses to the follow up questions from the May 20, 1999 joint hearing, entitled "Global Climate Change: The Administration's Compliance with Recent Statutory Requirements", before the Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs and the Subcommittee on Energy Research, Development, Production and Regulation.

If you have any questions for EPA regarding these responses, please contact me at 260-4332. Thank you for providing EPA the opportunity to testify on this important issue.

Sincerely,

DAVID GARDINER,
Assistant Administrator for Policy.

EPA'S RESPONSES TO FOLLOW-UP QUESTIONS

Question 1a. Please explain why the President's April 1999 report to Congress does not include one or more program performance measures for each of EPA's four line item Budget accounts with climate change funding.

Answer. EPA's climate change programs deliver a broad array of benefits to the American taxpayer, including reducing emissions of greenhouses gases, reducing emissions of other air and water pollutants, reducing energy consumption, and saving businesses and consumers money on their energy bills. EPA does include performance measures for its climate change programs under the Climate Change Technology Initiative (CCTI). EPA has CCTI funding in two budget accounts: Environmental Programs and Management (EPM) and Science and Technology (S&T). EPA reports performance measures under the CCTI in the same manner it reports other Agency programs. In its April 1999 report to Congress, EPA identified an extensive list of performance measures for CCTI: greenhouse gas emission reductions, NO_x emission reductions, SO₂ emission reductions, reductions in energy consumption, and money saved on utility bills. These performance measures identify results achieved by CCTI in the following key program areas: buildings, transportation, industry, carbon removal, and domestic and international capacity building.

Question 1b. Please explain why EPA's FY 2000 Annual Plan, as required by the Government Performance and Results Act, includes very few program performance measures for climate change, only a 2-year time series of data for these few performance measures (which makes it impossible to determine what taxpayers would, be getting for their tax dollars), and no 1990 base data?

Answer. The CCTI is an example of where EPA has developed results-oriented performance measures that meet the requirements of the Government Performance and Results Act (GPRA).

As required by GPRA, EPA's FY 2000 Annual Plan provides 2-year time data for all Agency programs. The plan identifies the performance measures for CCTI as list-

ed above in question 1a. which gauge performance by evaluating greenhouse gas and energy reductions and which demonstrate the outcomes of program activities as required by GPR. EPA's CCTI programs reduce GHG emissions; reduce other forms of pollution, including air and water pollution; reduce U.S. energy consumption; and build partnerships to vastly increase the penetration of energy efficient technologies throughout all sectors of the economy.

Please see question 1d. for information on using 1990 base data.

Question 1c. When will a full set of climate change performance measures and at least a 3-year time series of data be available for Congress to consider in this year's appropriations process?

Answer. EPA believes that it has provided a complete set of performance measures that clearly demonstrate the effectiveness of our climate change programs (see answers to questions 1a. and 1b. above). We have provided at least a 3-year time series of data in EPA's April 1999 Report to Congress which includes actual program results for the years 1995-1998.

Question 1d. When will 1990 baseline data be available for each of EPA's climate change performance measures?

Answer. Emission reductions due to EPA programs are estimated on an annual basis since their inception date and are compared to a "business as usual" scenario. EPA works with each of its program partners to estimate annual energy savings and emission reductions, aggregates these estimates, and then compares them to what emissions would have been in that year had program participants not invested in the better technology. In addition, EPA maintains an annual inventory that reports data on greenhouse gas emissions and sinks from 1990-1997. The inventory is used to assess overall trends in greenhouse gas emissions and sinks.

EPA's climate change programs have already produced substantial reductions in greenhouse gases. For example: EPA's programs reduced greenhouse gas emissions in 1997 by an estimated 22 million metric tonnes carbon equivalent (80.8 million tonnes CO₂ equivalent). Total U.S. emissions in 1997 were 1,813 million tonnes carbon equivalent (6,654 million tonnes CO₂ equivalent). For the future, we estimate that EPA's programs will reduce emissions by an estimated 58 million metric tonnes carbon equivalent (213 million tonnes of CO₂ equivalent) in 2000.

Question 2. In EPA's January 14, 1999 response to the House Subcommittee's December 2, 1998 oversight letter, EPA states that the agency "may expend funds to issue a rule, regulation, decree, or order for a number of purposes including the reduction of greenhouse gas emissions, as long as the expenditures are in implementation of existing law and not for the purpose of implementing, or in contemplation of implementing, the Kyoto Protocol."

a. If EPA were implementing the Kyoto Protocol under the guise of existing law, how would anybody outside the Agency know? Are there any criteria that would enable Congress to distinguish innocent actions (those that incidentally accomplish the purposes of the Kyoto Protocol) from prohibited actions (those that implement the Kyoto Protocol)?

Answer. EPA believes that the intent of Congress is clear in adopting the language in the FY 99 VA-HUD Appropriations Act restricting the use of funds. The Administration has committed not to implement the Kyoto Protocol before the Senate provides its advice and consent to ratification. EPA has acted entirely consistently with this Administration commitment, and will continue to do so in the future. Thus, we believe that statutory language restricting spending for implementation of Kyoto is unnecessary.

b. What additional statutory language might help prevent overzealous EPA officials from implementing Kyoto under the guise of existing authority, protect taxpayers and consumers from regulatory mission creep, and avoid even the appearance of impropriety?

Answer. As we have stated previously, the Administration has committed not to implement the Kyoto Protocol before the Senate provides its advice and consent to ratification. EPA has acted entirely consistently with this Administration commitment, and will continue to do so in the future. Thus, we believe that statutory language restricting spending for implementation of Kyoto is unnecessary.

Question 3. In late March 1999, on behalf of the U.S., EPA Administrator Carol Browner signed the G-8 Environment Ministers Communiqué' in Schwerin, Germany. Point 12 of the Communiqué' states: "We are making an immediate start on developing and implementing the domestic measures necessary to achieve significant reductions in greenhouse gas emissions and to show demonstrable progress by 2005." What is the significance of the year 2005—isn't it the date by which developed countries would be obliged, under the Kyoto Protocol (art. 3, Sec. 1), to have made demonstrable progress towards meeting their 2008-2012 emission reduction

targets? Does this mean the Administration is developing and implementing domestic measures for purposes of complying with the Kyoto Protocol?

Answer. Point 12 of the G-8 Environment Ministers Communique signed in March in Schwerin, Germany, is consistent with the President's Climate Change Plan announcement of October 1997. Stage one of the accompanying plan outlined a series of actions designed to reduce emissions over the next decade, and was envisioned to run until "around 2004". If fully funded, the Administration's program will achieve significant reductions in greenhouse gas emissions and will show demonstrable progress by 2005.

In addition, article 3, section 2 of the Kyoto Protocol states the following: "Each Party included in Annex I shall, by 2005, have made demonstrable progress in achieving its commitments under the Protocol." The Administration is not implementing and will not implement the Kyoto Protocol before the Senate provides advice and consent to its ratification.

Question 4. Point 16 of the G-8 Communique states that auto "fuel efficiency standards" can make an important contribution to improving energy efficiency and reducing emissions levels. On October 9, 1998, CEQ Chair Katherine McGinty testified before the House Subcommittee that there would be no increases in CAFE standards. Has the Administration changed its position? If so, what vehicle fuel efficiency measure does the Administration plan to develop, propose, or issue during the next two years?

Answer. The U.S. Department of Transportation has primary jurisdiction over this issue. The EPA is not aware of any changes in this position.

Question 5. EPA's FY 2000 performance plan states: EPA "will build a program that provides appropriate credit for early action."

a. Under what statutory authority will EPA build such a program?

Answer. Several statutes provide general authority for and/or authority for specific aspects of EPA's activities in this area. These statutes include: Clean Air Act, section 103(a) and (b); Pollution Prevention Act of 1990, 42 U.S.C. 13101 et seq.; National Environmental Policy Act of 1969, 42 U.S.C. 4321 et seq.; Global Climate Protection Act of 1987, 15 U.S.C. 2901; and Federal Technology Transfer Act, 15 U.S.C. 3710a.

In October 1997 and again in the January 1999 State of the Union Address, President Clinton expressed his support for the concept of providing credit for early reductions of greenhouse gases. EPA stated in its FY2000 Annual Performance Plan: "[i]n 2000, EPA will expand its work with these industries to build a program that provides appropriate credit for early action." In its recent Climate Change Report to Congress, prepared in response to Senate Appropriations Report 105-216, p. 74-75, EPA described this concept more fully, stating that "EPA will expand its work with [key energy intensive] industries and work across the Administration to help develop the basis for a program that could provide appropriate credit for early action." This work furthers the Administration's goals.

EPA's statement in the FY2000 Annual Performance Plan was not intended to indicate that EPA will implement an early action credit program in FY2000, but rather that EPA will work with key industries to identify areas where and the means by which environmental and economic benefits could be obtained from early action to reduce greenhouse gases. EPA believes these are important first steps in considering how such a program might be structured. Information provided by energy intensive industries also provides a basis for evaluating the scope of the benefits that might be achieved through providing credits for early action.

EPA's primary source of statutory authority for these activities is section 103(a) and (b) of the Clean Air Act. Section 103 of the Clean Air Act requires the Administrator to establish a "national research and development program for the prevention and control of air pollution." As part of this program, section 103(a)(1) requires the Administrator to, "conduct, and promote the coordination and acceleration of, research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects (including health and welfare effects), extent, prevention and control of air pollution." Section 103(b) provides that in carrying out subsection (a), the Administrator is authorized to "collect and make available, through publications and other appropriate means, the results of and other information, including appropriate recommendations by him in connection therewith, pertaining to such research and other activities." Section 103(g) of the CAA provides additional authority for some of the Agency's activities in this area. Section 103(g) provides that in carrying out subsection (a), "the Administrator shall conduct a basic engineering research and technology program to develop, evaluate, and demonstrate nonregulatory strategies and technologies for air pollution prevention." The program is to include among its elements, "[i]mprovements in nonregulatory strategies and technologies for preventing or reducing multiple air pollutants, including sulfur oxides, nitrogen oxides,

heavy metals, PM-10 (particulate matter), carbon monoxide, and carbon dioxide, from stationary sources, including fossil fuel power plants. Such strategies and technologies shall include improvements in the relative cost effectiveness and long-range implications of various air pollutant reduction and nonregulatory control strategies such as energy conservation, including end-use efficiency, and fuel-switching to cleaner fuels." These Clean Air Act provisions authorize EPA to explore and develop innovative, experimental approaches for prevention and control of air pollution, and an early action credit program would be one such approach.

b. Please describe the details of EPA's credit for early action program, including the requested funding level in Fiscal Years 1999, 2000, 2001, and the rest of the out years before 2008, and current and requested staffing.

Answer. As explained above, EPA does not have an early action credit program and has not requested any funding for an early action credit program.

c. What are EPA's program performance measures for this program so that Congress and the American know what they will be buying with their tax dollars?

Answer. As explained above, EPA does not have an early action credit program and has not requested any funding for an early action credit program.

Question 6. Some observers contend that credit for early action is a strategy to jump-start implementation of the non-ratified Kyoto Protocol and build a pro-Kyoto business constituency.

a. What does the word "early" in "credit for early action" mean? Does it mean earlier than the first compliance period of the Kyoto Protocol or some comparable regulatory regime?

Answer. In his last State of the Union message, the President stated his desire "to work with members of Congress in both parties to reward companies that take early, voluntary action to reduce greenhouse gases." Thus, the President is interested in working with Congress in determining what constitutes appropriate credit for near term action.

b. What does the word "credit" in "credit for early action" mean? Does it mean a regulatory credit that early reducers could use to offset mandatory obligations if, but only if, the Kyoto Protocol or a comparable domestic regime were ratified or adopted?

Answer. In his last State of the Union message, the President stated his desire "to work with members of Congress in both parties to reward companies that take early, voluntary action to reduce greenhouse gases." Thus, the President is interested in working with Congress in determining what constitutes appropriate credit for near term action.

c. Other things being equal, would recipients of such regulatory credits be more or less likely than non-recipients to support ratification of the Kyoto Protocol?

Answer. The President supports the concept of providing credit for early action to provide an incentive for entities to begin to take action now to deploy innovative technologies, realize cost savings, and reduce emissions of greenhouse gases. These are important objectives that are unrelated to the positions that different parties may take with respect to the Kyoto Protocol.

d. Since a credit for early action program would reward participants for doing today what they would be required to do under a ratified Kyoto Protocol, isn't such a program inherently "preparation for implementation" of the Kyoto Protocol or a comparable domestic regime?

Answer. The purpose of proposals to provide credit for early action is not to prepare for or implement the Kyoto Protocol. Regardless of whether the Kyoto Protocol or any domestic greenhouse gas reduction requirements enter into force, entities must make decisions now on potential investments that will reduce greenhouse gases, and they must make those decisions without knowing whether there will be future requirements to reduce greenhouse gas emissions or the form such requirements might take. In fact, some entities are reluctant to take advantage of cost savings available to them now through energy efficiency improvements because of concerns about effectively being penalized for acting if a future regulatory program failed to recognize those reductions. Thus, existing uncertainty about a possible future requirement affects voluntary emissions reductions now. Proposals to help entities act in light of this uncertainty do not presume that the Kyoto Protocol will enter into force, they simply recognize that the possibility of future requirements has real effects now that need to be addressed.

Question 7. In a document entitled "Binational Toxics Strategy: Stakeholder Forum (November 16, 1998; www.epa.gov/grtlakes/bns/stakeholders1198/hghilite.htm), EPA acknowledges that "fuel switching" from coal to natural gas is an expensive strategy for mercury control. However, EPA contends that fuel switching could become "a more cost-effective option" if utilities switch fuels to comply with "multiple" pollution reduction requirements. EPA specifically lists NO_x, SO₂,

particulate, and curiously, CO₂ as “pollutant” that utilities could reduce through fuel switching. The EPA document calls for creation of a “system of early reduction credits” arguing that credits earned by fuel switching “could be used for compliance with regulation that might be required in the future.”

Answer. Last November, U.S. EPA and Environment Canada hosted a meeting to which stakeholders from industry, environmental groups and governments were invited to discuss progress to date under the Binational Toxics Strategy. The minutes of that meeting make clear that the quotes that you attribute to EPA are, in fact, statements made by stakeholders who attended the meeting representing other organizations. Such statements do not constitute EPA’s position.

a. Since NO_x, SO₂, and particulates are already regulated, of what use would early reduction credits be in lowering the costs of fuel switching unless fuel switching were required to comply with future regulation of CO₂?

Answer. As stated above, early reduction credits were suggested by one of the stakeholders to the meeting, not by EPA, as a means of achieving early mercury control.

b. Absent a Kyoto Protocol or comparable domestic regulatory regime, how would early action credits earned for CO₂ reduction make fuel switching anything other than an expensive way to control mercury emissions?

Answer. The suggestion, made by a stakeholder who attended the meeting, not by EPA, was for early action credits for mercury emissions reductions.

c. In light of the foregoing, particularly EPA’s oblique comment about “regulations that might be required in the future,” please explain why the subcommittees should not infer that EPA expects and intends at some future date to regulate CO₂?

Answer. The material being quoted is a summary of a discussion that took place among a group of stakeholders. No inferences about EPA’s expectations or intentions should be made based on that discussion.

d. Given that fuel switching to control mercury is not cost-effective unless it is also a means of controlling CO₂, please explain why the Subcommittee should not assume that current and future EPA proposals to control mercury may be a pretext for regulating CO₂?

Answer. Given that fuel switching is not a cost effective means of controlling mercury, the Subcommittee would have no reason to assume that, should EPA propose to control mercury, such a proposal would be a pretext for regulating CO₂. In fact, EPA’s analysis shows that a mercury emissions standard would have very little effect on CO₂ emissions levels, because mercury control technologies are expected to be cost effective.

Question 8. Has EPA discussed implementation of a credit for early reduction program for greenhouse gases with the Department of State?

a. If so, did these discussions in any way consider how credit for early action would affect U.S. compliance under the Kyoto Protocol?

Answer. EPA has been involved in interagency discussions (including the Department of State) concerning credit for early action programs. The issue of compliance under the Kyoto Protocol was not linked to discussions of credit for early action programs.

b. Did such discussions assume that credits earned would be based on Kyoto targets and baselines?

Answer. No.

c. Has EPA discussed the credit for early reduction program with any other executive agency. If so, which agencies and with which officials in these agencies?

Answer. EPA has been involved in discussions concerning the characteristics of early reduction programs with White House agencies, the Departments of Energy, Justice, Defense, Treasury, Commerce, State, and the USDA. Specific individuals include:

Ron Minsk, National Economic Council
David Festa, Department of Commerce
Bob Cumby, Department of Treasury
Joe Aldy, Council of Economic Advisors
Janet Anderson, White House Climate Change Task Force
David Sandalow, Council on Environmental Quality

d. Please provide copies of any document between the EPA and the Department of State or any other executive agency concerning credit for early action.

Answer. EPA has not drafted documents responsive to this request.

Question 9. On April 15, 1998, EPA proposed to modify its 1994 settlement with the Natural Resources Defense Council by agreeing to study control strategies for regulating various “pollutants,” including CO₂.

a. Why, in order to settle a lawsuit over EPA's alleged failure to list and regulate sources of mercury emissions, did EPA agree to examine control strategies for regulating other "pollutants," including CO₂?

Answer. The settlement agreement that you refer to calls for a multiple pollutant analysis that looks at the relationship among the four most significant air pollutants from electric power generation: NO_x, SO₂, CO₂, and mercury. In agreeing to undertake that analysis, EPA proposed simply to update a series of multi-pollutant analyses of utility emissions that were first undertaken more than two years ago. The updated analysis called for in the proposed agreement is specifically intended to inform a decision that EPA must make under the Clean Air Act on whether to regulate mercury emissions from electric power plants. The commitment to do the study, which EPA had planned to do independently of any litigation, was included in the settlement agreement in order to obtain the litigants' agreement to an extension of time to make the decisions whether to regulate mercury emissions from electric power plants.

Multiple pollutant analysis of utility emissions makes sense because pollution control strategies to reduce emissions of these pollutants are highly inter-related. Strategies to reduce emissions of any one pollutant from power generation can have effects of differing magnitude on emissions of the other pollutants. The cost and other impacts of control strategies for these pollutants are also highly interdependent. Multiple pollutant analyses examine these inter-relationships and can provide valuable information to the electric power industry, the public, Federal agencies, and Congress about the relationships among policy choices to address the major pollutants from this industry.

The options examined in the study are hypothetical approaches to emission controls on the electric power industry for each pollutant and do not represent the EPA or Administration position on how any of these pollutants should be reduced in the future. Specifically with regard to carbon dioxide, the Administration has committed not to implement the Kyoto Protocol without the advice and consent of the Senate.

b. Is EPA pursuing any research or study that might result in a determination that CO₂ meets the criteria for regulation under one or more of the provisions of the Clean Air Act?

Answer. EPA is not pursuing any research or study intended to support a determination to regulate CO₂.

Question 10. The President's FY 2000 Budget requests \$200 million for a new "Clean Air Partnership Fund."

a. What is the statutory authority to achieve greenhouse gas reductions under this program?

Answer. The Clean Air Partnership Fund is a grant program designed to help local, state and tribal governments demonstrate innovative, multi-pollutant approaches to achieving cleaner air. Section 103 of the Clean Air Act provides the statutory authority necessary for the award of financial assistance to support activities that would be undertaken as part of the Clean Air Partnership Fund program. Section 103 requires the Administrator to establish a "national research and development program for the prevention and control of air pollution." As part of this program, section 103(a)(1) requires the Administrator to "conduct, and promote the coordination and acceleration of, research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects (including health and welfare effects), extent, prevention, and control of air pollution." Section 103(b)(3) authorizes the Administrator to make grants to support the activities listed in section 103(a)(1). The section 103(b)(3) grant authority thus includes the authority to fund demonstration projects, as well as related studies and investigations, such as those that would be supported through the Clean Air Partnership Fund program. These activities will produce some direct pollution reductions as a result of experiments with and demonstrations of innovative, multi-pollutant approaches to achieving cleaner air.

b. What performance measures has EPA identified to justify this proposed new program?

Answer. The Clean Air Partnership Fund will be used to provide grants to local and state governments, tribes and multi-state organizations to demonstrate ways to reduce air pollution. The Partnership Fund will provide vital resources to state and local governments to fulfill their clean air obligations such as attainment of the national ambient air quality standards and implementation of protective urban air toxic strategies. The Clean Air Partnership Fund will support research, development and demonstration projects that: (1) control multiple air pollution problems simultaneously; (2) leverage the original Federal funds; (3) facilitate meaningful public involvement; and (4) provide innovative approaches to air pollution control that could be replicated in other cities and states.

c. What safeguards would EPA put in place to ensure that the requested funds would not be used to recruit and train pro-Kyoto activists or to build an expanded grassroots constituency for the Administration's climate change policies?

Answer. If funded, EPA will implement and administer the Clean Air Partnership under Section 103 of the Clean Air Act which requires the Administrator to establish a "national research and development program for the prevention and control of air pollution." As part of this program, section 103(a)(1) requires the Administrator to "conduct, and promote the coordination and acceleration of, research, investigations, experiments, demonstrations, surveys, and studies relating to the causes, effects (including health and welfare effects), extent, prevention, and control of air pollution." Section 103(b)(3) authorizes the Administrator to make grants to support the activities listed in section 103(a)(1). The section 103(b)(3) grant authority thus includes the authority to fund demonstration projects, as well as related studies and investigations, such as those that would be supported through the Clean Air Partnership Fund program. EPA will apply the normal terms and conditions on the use of the CAPF grant awards as are associated with other EPA grants and will use the following selection criteria, and possibly others, in the award of CAPF grants: 1) reduction of multiple air pollutants; 2) demonstration of innovative programs or technologies which reduce or prevent multiple air pollutants; 3) significant leveraging of Federal (CAPF) funds; and 4) the ability to be replicated elsewhere.

Question 11. David Gardiner's testimony emphasizes that EPA's CCTI programs "are completely voluntary." Yet on the preceding page, Mr. Gardiner states that "stage three" of the President's program is "an emissions cap and trading system"—in other words, a mandatory program. How can EPA contend that a program designed to lay the foundation for a mandatory program is truly "voluntary"?

Answer. The President, in a speech on climate change policy on October 22, 1997, proposed a three-stage plan to address greenhouse gas emissions, beginning with voluntary partnerships to make greater use of technologies that save energy, reduce pollution, and save money, and culminating with a cap and trade program for greenhouse gases starting in 2008. The President has not indicated further as to how or when this program would be undertaken, or by what agency. The Administration has pledged to work with Congress on any necessary legislation. The purpose of the voluntary partnerships in stage one is, as noted above, to make greater use of technologies that save energy, reduce pollution, and save money. The partnerships are completely voluntary and involve only sources that choose to participate to obtain these benefits.

Question 12. Mr. Gardiner states that EPA's climate-related and energy-efficiency programs have 7,000 voluntary partners.

a. If EPA had no regulatory authority, how many of EPA's business partners would still want to volunteer—all, most, few, or none? On the basis of what information does EPA base its estimate?

b. How many partners "volunteer" just to ensure a seat at the bargaining table if and when EPA begins the stage-three mandatory phase—all, most, few, or none? On the basis of what information does EPA base its estimate?

Answer. EPA has been operating voluntary programs to promote energy efficiency since the early 1990's and the partnership list has grown fairly constantly over this period. EPA's programs are promoted based on the direct savings and leadership opportunities that they offer businesses and consumers. Based on information that EPA has collected, partners join these programs for a variety of reasons including wanting to save money on their energy bills, wanting to take advantage of a ready-made program that they can easily build into their operations and planning, wanting public recognition for good work, and wanting to be good environmental citizens. EPA has no evidence that any partners have joined due to EPA's regulatory authority or because they want a seat at the table for discussions of future climate change policies.

Question 13. In his testimony, Jerry Taylor of the Cato Institute argues that, even assuming the correctness of the Administration's emission reduction estimates, CCTI would provide essentially no protection from the potential risks of global climate change. Mr. Taylor makes the following observations: (a) the world's most advanced climate model predicts that full implementation of the Kyoto Protocol would lower global temperatures 0.07 degrees Celsius by the year 2050; (b) the U.S. emits about 20% of the world's greenhouse gases, which implies the U.S. compliance with the Kyoto Protocol would reduce global temperatures 0.014 degrees Celsius by 2050; (c) according to DOE and EPA, their contributions to CCTI would reduce U.S. greenhouse gas emissions by no more than 452 million metric tons—about 65 percent of the U.S. Kyoto target; (d) therefore, CCTI would reduce global temperatures .0091 degrees Celsius below where they otherwise would be by the year 2050. Mr. Taylor concludes: "Such a change in temperature is too small to measure. Moreover, I defy

the administration to argue that this infinitesimal reduction in temperature will affect the lives of the American people one whit.”

a. Do you concur with Mr. Taylor’s assessment? If not, please specify which steps in his reasoning you disagree with and why.

b. Mr. Taylor’s analysis suggests that CCTI makes sense as climate policy only in connection with the Kyoto Protocol and other, even more stringent greenhouse gas emissions control treaties. Yet, in the Conference Report accompanying the 1999 VA-HUD Appropriations Act, Congress instructed the Administration to show how these [climate change] programs are justified by goals and objectives independent of the implementation with the Kyoto Protocol. Please explain why CCTI is sensible climate change policy separate and apart from the Kyoto Protocol.

Answer. CCTI outlines programs that make sense for a variety of environmental and economic reasons. These programs are already seeing great success in working with the marketplace and they can be readily expanded to build on additional opportunities in the marketplace, as outlined in EPA’s FY 2000 Budget Justification. These programs promote investments in technologies and practices that simultaneously reduce energy bills and reduce emissions of a number of air pollutants. EPA estimates that for every dollar that EPA spends on these programs, organizations and consumers are saving more than \$70, and pollution is being substantially reduced. These savings add real financial benefits to organizations and consumers across the country.

RESPONSES TO QUESTIONS FROM SENATOR GRAHAM

Question. How would you describe EPA’s coordination with DOE?

Answer. EPA and DOE have established a highly leveraged partnership in order to carry out the U.S.’s Climate Change Technology Initiative and promote energy efficiency and its benefits across the country. EPA and DOE have developed different and complementary areas of focus. DOE, for example, concentrates on the research, development, and demonstration of advanced technologies. EPA, on the other hand, focuses more on the deployment of existing technologies that are financially attractive but underutilized across our economy. EPA educates organizations and consumers across the country about the environmental benefits of energy efficient technologies and provides a variety of informational tools that can make the cost-effective energy efficiency choice an easy choice for most consumers.

A good example of the close coordination between the two agencies is the ENERGY STAR Labeling Program where EPA and DOE each manage specific product areas and coordinate on program implementation, outreach, recognition and other aspects of program implementation.

This partnership is important because energy and environment are not independent from each other. Using energy causes air pollution. Technology is a widely agreed upon solution for cost-effectively reducing air pollution while maintaining our standard of living. It makes sense for DOE and EPA to be working together to promote existing technologies and advancing new technologies so as to conserve natural resources, protect the environment, and enhance economic growth.

Question. Does EPA have well defined goals for the climate programs into the future?

Answer. Yes, EPA’s climate change programs have very clear and well defined goals for the future. As provided in the Administration’s Report to Congress and/or EPA’s 2000 Budget request, in 2000 EPA efforts will:

- reduce emissions of greenhouse gases by 58 MMTCE (213 million metric tons of carbon dioxide—equivalent to eliminating the GHG emissions from 15% of the cars, sports utility vehicles, and light trucks on the road) across key sectors of the economy;
- 12.7 MMTCE through its building programs;
- 5.7 through its transportation programs;
- 37.9 MMTCE through its industry programs;
- 1.7 through its state and local climate change programs;
- reduce other forms of pollution, including air pollutants such as NO_x, particulate matter and mercury from energy efficiency and reduce water pollution (from better fertilizer management). NO_x emissions will be reduced by more than 152,000 tons in 2000;
- reduce U.S. energy consumption by more than 59 billion kilowatt hours in 2000;
- provide \$8 billion in energy bill savings to consumers and businesses;
- develop a new generation of efficient and low polluting cars and trucks;
- build partnerships to vastly increase the penetration of energy efficient technologies throughout all sectors of the economy.

EPA is requesting a \$107 million increase in 2000 funding for its climate technology programs in order to target additional cost-effective opportunities to reduce greenhouse gas emissions, emissions of criteria air pollutants, and energy consumption throughout all sectors of the economy. The request is part of the President's five-year Climate Change Technology Initiative. Over the next decade, the increase in funding for EPA will deliver at least:

- 354 MMTCE of greenhouse gas emissions (1.3 billion tons carbon dioxide equivalent);
- \$35 billion in energy savings to families and businesses;
- 850,000 tons of NO_x emissions reductions.

Based on EPA's analysis, with the increased funding, EPA expects that actions taken through their voluntary initiatives to result in annual carbon emission reductions of about 210 MMTCE annually by 2010, a 60% increase over existing EPA targets for 2010.

Question. How have EPA's programs been used as models for similar programs overseas? Are others benefitting from our lessons learned?

Answer. The voluntary, partnership program models pioneered by EPA have generated great interest around the world. The impact of EPA's innovative, non-regulatory approaches on other countries' policies and programs goes far beyond the specific incidences where our programs have served as models for individual programs. Policy makers around the globe are now considering ways in which market-based programs can be used to reward outstanding environmental accomplishments, and provide incentives to go beyond minimum regulatory requirements. These countries are benefitting from our lessons as they develop their infrastructure for clean energy technology deployment.

As an example, the Energy Star labeling program for office equipment is being replicated in its entirety by governments in many other countries. Recognizing the common problem of tremendous growth in computer and other office equipment sales—and associated energy consumption—many other countries are interested in encouraging the most efficient design and use of such equipment.

EPA's Green Lights and ENERGY/STAR Programs have inspired domestic program designs in several countries, including China, South Africa, Mexico, and the Philippines.

EPA's methane programs have shared information with and provide technical assistance to several developing and transition countries, including Brazil, Kazakstan, India, Mexico, Philippines, Poland, and Russia.

EPA's Voluntary Aluminum Industrial Partnership is also viewed as a model for a voluntary program which establishes goals for reducing emissions of perfluorocarbons where technically and economically feasible and for facilitating information and technology transfer within the industry.

Question. What role is EPA serving by implementing these programs?

Answer. EPA's voluntary programs effectively help reshape the way energy-using products are purchased and the way energy is managed in buildings and facilities by removing market barriers that impede organizations, businesses, governments and consumers from investing in energy-efficient technology.

One of the biggest barriers in today's marketplace is lack of clear information about the value of energy-efficiency and the performance of products. Decision makers in the public and private sector as well as consumers do not have the information and tools that they need to make the smartest investments. For example, consumers often do not consider the savings from lower energy bills associated with buying more energy-efficient products. EPA's voluntary programs are providing clear, unbiased technical information to all sectors of the economy on the value of energy-efficient products and practices.

Another very important impediment is limited access to capital, as financial lenders generally do not recognize the "soundness" of energy-efficiency. EPA's voluntary programs work with financial institutions to demonstrate the higher value and lower risks of energy-efficient product purchases, and encourage lending institutions to offer more attractive financing packages for purchasing these products.

In addition, a variety of "split incentives" exist in the marketplace such as between landlords and tenants as well as builders and buyers that limit the accessibility of energy-efficient products to certain buyers. Split incentives are present where one party has an opportunity to make an investment to produce net savings through energy efficiency, but such savings would be realized by another party, which removes the incentive for the first party to act. EPA's voluntary programs attempt to remove this barrier to action by providing opportunities for the same party to make the efficiency investment and reap the associated financial rewards of lower energy costs.

EPA's technology deployment programs are demonstrating, cost-effectively that by addressing these barriers, greenhouse gas emissions can be reduced with a positive impact on the economy. For every dollar spent by EPA, the deployment programs have

- reduced greenhouse gas emissions by 2.5 tons of carbon dioxide equivalent and
- delivered \$70 in energy bill savings to consumers and organizations.

There is tremendous opportunity for these programs to build on this success and deliver even greater benefits across the country in the future. Over 60% of this country's carbon emissions in the year 2010 will come from products purchased between now and then. EPA's programs help these equipment buyers choose the energy efficient solution, providing large energy and dollar savings as well as pollution prevention.

Question. How would you describe EPA's track record to date?

Answer. EPA's climate programs have been extremely successful at cost-effectively meeting their targets for reducing greenhouse gas emissions, reducing energy consumption and saving businesses, consumers and other organizations money on utility bills. For every dollar spent by the EPA on these programs, two and a half tons of carbon dioxide emissions are avoided and the nation's energy bill is reduced by more than \$70.

EPA's programs have exceeded their CCAP goals and are on target to continue meeting their future goals. Through 1998, EPA's Climate Change programs have reduced U.S. greenhouse gas emissions 260 million tons of carbon dioxide equivalent (70 MMTCE). EPA's partners, now over 7,000 in number, are reducing emissions of carbon dioxide and other long-lived greenhouse gases such as methane and perfluorocarbons by implementing energy-efficiency upgrades as well as industrial best management practices. These improvements have reduced energy consumption by more than 71 billion kilowatt hours (kWh), saving families and businesses more than \$6.5 billion and keeping more than 150,000 tons of smog-forming nitrogen oxide (NO_x) pollution from entering the air.

In 1998 alone, these programs:

- Conserved enough energy to light 35 million homes for the year.
- Prevented NO_x emissions equivalent to the annual pollution from 46 power plants.
- Avoided greenhouse gas emissions equivalent to taking more than 22 million cars off the road for the year.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC, June 30, 1999.

Hon. CAROL M. BROWNER,
Administrator, Environmental Protection Agency, Washington, DC.

DEAR ADMINISTRATOR BROWNER: Thank you for the Environmental Protection Agency's (EPA's) June 23, 1999 letter responding to questions submitted by the House Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs and the Senate Subcommittee on Energy Research, Development, Production and Regulation as a follow up to the May 20, 1999 joint hearing, entitled "Global Climate Change: The Administration's Compliance with Recent Statutory Requirements." Some of EPA's answers contain new and useful information. However, other answers are unacceptably non-responsive and even evasive.

In Question 2a on the 1999 VA-HUD Appropriations Act limitation, popularly known as the Knollenberg Amendment, we asked: "If EPA were implementing the Kyoto Protocol under the guise of existing law, how would anybody outside the agency know? Are there any criteria that would enable Congress to distinguish innocent actions (those that incidentally accomplish the purposes of the Kyoto Protocol) from prohibited actions (those that implement the Kyoto Protocol)?" EPA replied: "The Administration has committed not to implement the Kyoto Protocol . . . EPA has acted entirely consistently with this Administration commitment . . . Thus, we believe that statutory language restricting spending for implementation of Kyoto is unnecessary. This response does not address the question asked. EPA's evasiveness on this critical issue can only reinforce the perception of many in Congress that EPA interprets the Knollenberg Amendment as a practical nullity, permitting EPA to implement the Protocol under existing law as long as EPA officials are willing to be less than completely candid about what they are doing.

In Question 6c on early action crediting, we asked: "Other things being equal, would recipients of such regulatory credits be more or less likely than non-recipients to support ratification of the Kyoto Protocol?" EPA's answer to this question is

equally evasive: "The President supports the concept of providing credit for early action to provide an incentive for entities to begin to take action now to deploy innovative technologies, realize cost savings and reduce emissions of greenhouse gases. These are important objectives that are unrelated to the positions that different parties may take with respect to the Kyoto Protocol." I can only conclude that companies receiving early action credits would be more likely than non-participants to favor ratification. After all, participants would acquire paper assets potentially worth millions of dollars but which would have actual cash value only if the Kyoto Protocol, or a comparable domestic regulatory regime, were ratified or adopted.

In Question 10b on the Administration's proposed Clean Air Partnership Fund, we asked: "What performance measures has EPA identified to justify this new program?" Instead of providing performance measures—quantifiable results by which the program may be evaluated—EPA states that the program will "support research, development and demonstration projects that: (1) control multiple air pollution problems simultaneously; (2) leverage the original Federal funds; (3) facilitate meaningful public involvement; and (4) provide innovative approaches to air pollution control that could be replicated in other cities and states." This non-responsive answer inspires little confidence that Clean Air Partnership Fund grants would not be used as "greenhouse pork" to manufacture "grassroots" support for the Kyoto Protocol.

In Question 13a on the overall value and effectiveness of the Climate Change Technology Initiative (CCTI), we asked EPA to comment on Jerry Taylor's assessment that the CCTI would reduce average global temperatures by a hypothetical and miniscule .0091 degrees Celsius by 2050. This "infinitesimal reduction in temperature," Mr. Taylor concluded, is "too small to measure" and would not "affect the lives of the American people one whit." We summarized Mr. Taylor's argument in four steps, and asked EPA to specify which steps, if any, EPA disagrees with and why. EPA simply ignored this question. I am forced to conclude that, although the Administration has some *output* performance measures for its climate change programs, it has no *intermediate outcome* and no *final outcome* measures. That is to say, although the Administration offers some estimates of the tons of greenhouse gas emissions that would be reduced, it cannot estimate how such reductions would affect global climate, nor can it estimate how such climate impacts (if any) would affect human health and welfare. Of course, EPA's evasion of this question may simply reflect the fact that the science of climate change is still a relatively new and immature discipline.

In Question 13b, we asked, in light of Mr. Taylor's conclusion that the CCTI would have no discernible effect on global climate, "why CCTI is sensible climate policy separate and apart from the Kyoto Protocol" or other even more stringent international agreements to control greenhouse gas emissions. Instead of addressing this question, EPA commented on the alleged co-benefits of the CCTI programs, such as lower energy bills and reduced air pollution. From this evasive answer, I am forced to conclude that as *climate change policy*, the CCTI is not a sound investment of taxpayer dollars.

Whether or not Congress should follow the Administration down a policy road that leads ultimately to the Kyoto Protocol and the regulation of America's energy economy is a very serious issue. The questions Senator Nickles and I submitted to you on May 27th deserve commensurately serious answers. The answers EPA has provided to questions 2a, 6c, 10b, 13a, and 13b are not acceptable. Please provide responsive answers to those questions. The responses should be delivered to the House Subcommittee staff in B-377 Rayburn House Office Building by no later than July 15, 1999. I will be sending you additional questions in a separate communication in response to other parts of EPA's June 23rd letter. If you have any questions, please contact Staff Director Marlo Lewis at 225-1962.

Sincerely,

DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC, July 22, 1999.

Hon. CAROL M. BROWNER,
Administrator, Environmental Protection Agency, Washington, DC.

DEAR ADMINISTRATOR BROWNER: As indicated in my June 30, 1999 letter to you, I am sending additional questions about the Environmental Protection Agency's (EPA's) June 23rd response to the joint May 27th letter from Chairman Don Nickles and me.

Pursuant to the Constitution and Rules X and XI of the United States House of Representatives, please provide the Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs with detailed information in response to the attached questions regarding EPA's role in global climate change policy.

Responses should be delivered to the Subcommittee office in B-377 Rayburn House Office Building not later than noon on Wednesday, August 4, 1999. If you have any questions about this request, please contact Staff Director Marlo Lewis at 225-1962. Thank you for your attention to this matter.

Sincerely,

DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs.

[Attachment]

[Responses to the following questions were not received at the time this hearing went to press.]

Question 1. In response to Question 5a on early action crediting, EPA quotes the following statement from its recent climate change report to Congress: "EPA will expand its work with [key energy intensive] industries and work across the Administration to help develop the basis for a program that could provide appropriate credit for early action." EPA also states: "EPA will work with key industries to identify areas where and the means by which environmental and economic benefits could be obtained from early action to reduce greenhouse gas emissions."

a. Please describe the work EPA has done to date with industry to develop the basis for an early action crediting program. Please provide copies of all letters, documents, e-mails, or other written communications sent by EPA to executives or representatives of companies in key industries on the subject of early action crediting.

b. As you know, some environmental groups claim that early action crediting would reward companies for making emission reductions that would have occurred anyway without any special incentive or inducement—the so-called "anyway tons" problem. What is EPA's view of this criticism? Does EPA believe that, under a well-designed early action program, the credits would be valuable enough to motivate companies to make energy-efficiency, carbon reduction, or carbon sequestration investments they otherwise would not make?

Question 2. In response to Question 7 on the "Binational Toxics Strategy: Stakeholder Forum," EPA states: "The minutes of the meeting make clear that the quotes you attribute to EPA are, in fact, statements made by stakeholders who attended the meeting representing other organizations. Such statements do not represent EPA's position."

a. Please identify the stakeholder(s) who suggested that a "system of early reduction credits" would make fuel switching from coal to natural gas less expensive as a mercury emissions control strategy if fuel switching were also required to comply with future regulation of CO₂.

b. Please provide the complete text of EPA's minutes of that meeting.

Question 3. In response to Question 9a on EPA's proposed settlement with the Natural Resources Defense Council (NRDC), EPA states that it "proposed simply to update a series of multi-pollutant analyses of utility emissions that were first undertaken more than two years ago." However, several aspects of this case remain perplexing. NRDC did not sue EPA for failing to regulate CO₂. EPA has no obligation under the Clean Air Act to regulate CO₂. Furthermore, although CO₂ regulation could be used to control mercury emissions, regulating CO₂ presumably is not the most direct, effective, or politically feasible means of controlling mercury emissions.

a. Taking into account the issues raised above, please explain more clearly why EPA, to settle a lawsuit over its alleged failure to regulate mercury pollution, agreed to examine regulatory strategies to control emissions of CO₂.

b. Please provide the Subcommittee with the original series of multi-pollutant analyses that EPA now proposes to “update.” In your document submission, please identify or highlight the analysis (or analyses) showing the effect of mercury regulation on CO₂ emissions and the effect of CO₂ regulation on mercury emissions.

Question 4. In response to Question 13 on Jerry Taylor’s assessment that the Climate Change Technology Initiative (CCTI) is not cost-effective, EPA claims that “for every dollar that EPA spends on these [CCTI] programs, organizations and consumers are saving more than \$70, and pollution is being substantially reduced.”

a. Has EPA conducted an economic analysis documenting the claim that its CCTI programs generate \$70 in savings for every \$1 invested? If so, please provide a copy of that analysis to the Subcommittee.

b. Has EPA’s estimate been peer-reviewed by qualified independent researchers? If so, please provide the reviewers’ names and contact information, copies of the peer review comments submitted to EPA, and any citations to the professional economics literature where independent confirmation of EPA’s estimate has been published.

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF AIR AND RADIATION,
Washington, DC, July 23, 1999.

Hon. DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs, Committee on Government Reform, U.S. House of Representatives, Rayburn House Office Building, Washington, DC.

DEAR MR. CHAIRMAN: I am writing in response to your letter of June 30, 1999, regarding EPA’s answers to follow-up questions asked by you and Senator Nickels after the May 20, 1999, joint hearing before your subcommittees on global climate change issues. I can assure you that we made every effort to be fully responsive to those follow-up questions.

Regarding question 2a, there is no basis for any implication that EPA officials are not being candid about their actions. EPA has repeatedly committed not to implement the Kyoto Protocol without Senate advice and consent to ratification. You have inquired into dozens of EPA rulemakings, voluntary programs, and other actions over the past two years, and we have answered your questions in detail. I believe our responses show that in carrying out our responsibilities under existing laws and programs for which Congress has appropriated funds, EPA has complied at all times with the Knollenberg amendment. Finally, the Administration does not believe the Knollenberg amendment is, in your words, “a practical nullity.” Rather, the Administration believes the amendment is unnecessary, because EPA is not attempting to implement the Protocol prior to ratification.

On question 6c concerning credit for early action, there is no simple relationship between support for credit for early action and support for ratification. The fact is that many firms that are most interested in obtaining credit for early actions are also steadfastly opposed to going forward with the Kyoto Protocol.

As for question 10b, there is no basis for your concerns about the Clean Air Partnership Fund. EPA’s original response indicated that the CAPF will incorporate several types of performance and evaluation measures. The measures summarized in our response are consistent with measures that EPA has developed for other Congressionally-funded competitive grants programs where a mix of qualitative and quantitative criteria are used. For example, the grant program for the Brownfields Revolving Loan Fund Demonstration Pilots employs one threshold criteria (“ability to manage a revolving loan fund and environmental cleanup) and four evaluation criteria (“demonstration of need, commitment to creative leveraging of EPA funds, benefits of pilot loans to the local community, and long-term benefits and sustainability”). Our intention is to incorporate similar measures in the solicitation for CAPF proposals. As required for all grants, EPA will ensure that recipients are informed of the legal restrictions on the use of grant funds for lobbying, publicity, and propaganda contained in OMB Circulars No. A-21 and No. A-122. In particular, these restrictions prohibit activities intended to influence elections or referenda or to influence the introduction or passage of Federal or State legislation through contacts with members or employees of Congress or State legislatures or through grassroots lobbying efforts.

Regarding question 13a, the argument advanced by the Cato Institute’s Jerry Taylor misses the importance of slowing the *rate* at which the climate changes. The Administration has very clearly articulated the scientific basis for concern about the current trend of rapidly increasing greenhouse gas emissions and concentrations,

and the unprecedented rate at which the climate system is expected to undergo change as a result. The key scientific conclusions are summarized in a 1997 Office of Science and Technology Policy report entitled *Climate Change: State of Knowledge*. (I am enclosing a copy of this report, which contains the figures referred to in the passages quoted below.) The report notes (p. 4):

The overall emissions of greenhouse gases are growing at about 1 percent per year. For millennia, there has been a clear correlation between CO₂ levels and the global temperature record. Fluctuations of CO₂ and temperature have roughly mirrored each other over the last 160,000 years (Figure 5). The current level of CO₂ is already far higher than it has been at any point during this period. If current emission trends continue over the next century, concentrations will rise to levels not seen on the planet for 50 million years.

The report continues (p. 10):

Even if the rate of emissions is slowed enough to limit atmospheric concentrations to about 550 ppm, or roughly double the preindustrial level, the U.S. could experience temperature increases of 5° F to 10° F (Figure 11). These warmer temperatures would lead to soil drying in some regions, with drying estimated at 10 percent to 30 percent for the United States during the summer growing season (Figure 12).

Greenhouse gas concentrations could rise well beyond a doubling if current emissions trajectories are not altered. According to the OSTP report (p. 11), at four times preindustrial CO₂ levels (roughly 1100 ppm): “the estimated temperature increase for the United States would be 15° to 20° F, and soil drying could approach 30 percent to 50 percent during the growing season (Figures 13 and 14).” The warming would be most severe over much of the mid-latitude area of North America, which includes our agricultural heartland. A wide range of potential adverse effects—from the spread of human diseases to the rise of sea levels along the world’s heavily populated coasts—are surveyed at pages 12-16 of the report. The report concludes (p. 17):

The faster the rate of change in climate, the less time there will be for both ecological and socio-economic systems to adapt and the greater the potential for “surprises” or unanticipated events. Given the long time lags between cause and effect and between effect and remedy, a prudent course of action is to slow the rate of change.

It has been estimated that even assuming no other actions were taken, meeting the Kyoto targets would delay any given temperature increase and its associated effects by one to two decades. This would allow both ecosystems and socio-economic systems valuable additional time to adapt to changing conditions.

Mr. Taylor’s argument also assumes that our CCTI programs are implemented in isolation and that nothing is done by the private sector portion of our economy, or by other nations, to help slow the rate of change. In fact, many firms in this country, and many other nations, are already taking initial steps to change their emissions paths. Thus, we believe the CCTI programs represent a highly prudent investment in beginning to slow this rate of change and the risks that accompany it.

Finally, you asked in question 13b why our CCTI programs are “sensible climate policy separate and apart from the Kyoto Protocol.” Our response cited the multiple economic and environmental benefits these programs provide above and beyond reductions in greenhouse gases, through energy bill savings and pollution reductions. The expected reductions in both conventional pollutants and greenhouse gases were summarized in both our FY2000 budget justification, to which the answer expressly referred, and in the accompanying answers to questions from Senator Graham. We also noted that for every dollar EPA spends on these programs, the participating businesses, schools, hospitals, homeowners, consumers, state and local governments, and others are receiving more than \$70 dollars in economic savings. That is an impressive rate of return for any public investment.

If you have any further concerns regarding these responses, please contact me or my staff at (202) 260-7400.

Sincerely,

ROBERT PERCIASEPE,
Assistant Administrator.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC, August 12, 1999.

Hon. CAROL M. BROWNER,
Administrator, Environmental Protection Agency, Washington, DC.

DEAR ADMINISTRATOR BROWNER: Thank you for the Environmental Protection Agency's (EPA's) July 23, 1999 letter responding to my letter of June 30th about EPA's interpretation of the Knollenberg provision in the 1999 VA-HUD Appropriations Act and other issues raised in the May 20th joint House-Senate hearing on the Clinton Administration's compliance with recent statutory requirements governing global climate change policy.

EPA's July 23rd letter clarifies that the Clean Air Partnership Fund may not be used to support grassroots lobbying efforts. However, it does not resolve the issue of whether EPA regards the Knollenberg provision as permissive or prohibitive.

EPA's July 23rd letter states that, "the Administration does not believe the Knollenberg amendment is, in your words, 'a practical nullity.' Rather, the Administration believes the amendment is unnecessary, because EPA is not attempting to implement the Protocol prior to ratification." However, other statements and actions by EPA imply that the Knollenberg provision is a porous barrier to Kyoto-inspired programs, initiatives, and discretionary regulatory activities.

EPA's interpretation, as set forth in its February 18th Office of General Counsel draft summary, is that "EPA may expend funds to issue a regulation for a number of purposes including the reduction of greenhouse gas emissions, as long as the expenditures are in implementation of existing law and not for the purpose of implementing, or in preparation for implementing, the Kyoto Protocol." In essence, EPA argues that it may use existing regulatory authority to accomplish the purposes of the Kyoto Protocol as long as such regulation does not implement the Kyoto Protocol. But, this is semantic hair-splitting—the assertion of a distinction without a difference.

For the Knollenberg provision to be a constraint as intended, the test of EPA's compliance cannot simply be whether EPA is implementing "existing law." After all, every rule EPA proposes or issues is presumably for the purpose of implementing existing law (unless the rule is overturned or suspended in court, as in the recent National Ambient Air Quality Standards decision). The real issue is whether EPA is using, or intends to use, existing statutory and regulatory authority to implement the Kyoto Protocol while claiming to address other issues or pursue other objectives.

It was in order to clarify exactly what EPA believes is or is not prohibited by the Knollenberg provision that Senator Nickles and I, in our May 27th letter, posed the following questions: "If EPA were implementing the Kyoto Protocol *under the guise* of existing law, how would anybody outside the agency know? Are there any criteria that would enable Congress to distinguish innocent actions (those that incidentally accomplish the purposes of the Kyoto Protocol) from prohibited actions (those that implement the Kyoto Protocol)?" EPA's June 23rd letter simply evaded that question: "The Administration has committed not to implement the Kyoto Protocol. . . . Thus, we believe that statutory language restricting spending is unnecessary." I regret to say that EPA's July 23rd letter continues to evade this question even while denying any intention to be evasive.

In the hope of moving this discussion forward, I will now offer a reading of the Knollenberg provision that supplies criteria for distinguishing between permissible and prohibited actions. It is a reading, moreover, that Congressman Knollenberg endorsed at the May 20th joint hearing.

As I read the Knollenberg provision, EPA may not propose or issue regulations, or enter into consent decrees, that would have the effect of limiting emissions of carbon dioxide and other greenhouse gases covered under the Kyoto Protocol unless such regulations are specifically required by law. The key concept here is the distinction between *mandatory* and *discretionary* actions.

Some regulations that may be required by current law may also incidentally reduce emissions of carbon dioxide and other greenhouse gases. The Knollenberg provision does not limit regulations of that kind. Such regulations are clearly not "for the purpose of implementing . . . the Kyoto Protocol," however much these regulations may also have the effect of reducing greenhouse gas emissions. The situation is quite different, however, in the case of greenhouse gas-reducing regulations that are discretionary, i.e., not specifically mandated by existing law. Congress is entitled to presume that any such regulation is Kyoto-inspired. Unless EPA can disprove that presumption, the rule conflicts with the Knollenberg provision and, thus, is prohibited.

The only exception may be for discretionary regulations that are also necessary to reduce an imminent threat to public health and safety. If a discretionary rule is needed to address an imminent threat to public health and safety, then the proposal or issuance of the rule is also not “for the purpose of implementing . . . the Kyoto Protocol,” even if the rule has the effect of reducing greenhouse gas emissions. However, any action of this nature must go through the public notice and comment process before its *bona fides* as a non-Kyoto-inspired rule can be assured.

This reading of the Knollenberg provision squares with common sense. Although the Knollenberg provision does not prohibit EPA from carrying out any mandatory requirements of existing law, it cannot be understood as permitting EPA to do everything it otherwise has discretion to do under existing law. For, in that case, the provision would say no more than that EPA’s actions must be legal—a superfluous requirement, since all proposed rules must be justifiable under existing law.

To put this another way, the Knollenberg provision cannot be understood as requiring complete candor on the part of EPA officials in order to be enforceable. The whole point of the provision is to prevent stealthy (“backdoor”) efforts to implement a non-ratified treaty. Yet, under EPA’s interpretation, any greenhouse gas-reducing regulation, even if intended to implement the Kyoto Protocol, is permissible as long as the treaty is never mentioned in the administrative record accompanying the rulemaking or public statements describing it. Congress under its Congressional Review Act authority and the Office of Management and Budget under its regulatory review role must have an independent basis for determining whether any greenhouse gas-reducing regulation proposed or issued by EPA is or is not in compliance with the Knollenberg provision. Otherwise, the Knollenberg provision is unenforceable, and Congress cannot be supposed to have enacted an unenforceable restriction.

In summary, if the Knollenberg provision is to bar Kyoto-inspired regulation without impeding agency actions specifically mandated by law, and, if its enforcement is not to depend on the candor of the very officials whom the provision is intended to constrain, then the provision must be understood as limiting EPA’s discretionary authority with respect to all Kyoto-covered gases.

I welcome EPA’s comments on my reading of the Knollenberg provision. Therefore, pursuant to the Constitution and Rules X and XI of the House of Representatives, I request that EPA’s Office of General Counsel assess the argument, presented above, that the Knollenberg provision limits EPA’s discretionary authority to propose or issue rules, regulations, decrees, or orders that may have the effect of reducing emissions of carbon dioxide and other greenhouse gases.

EPA’s response should be delivered to the Subcommittee office in B-377 Rayburn House Office Building by Wednesday, September 1, 1999. If you have any questions about this request, please contact Staff Director Marlo Lewis at 225-1962. Thank you in advance for your attention to this matter.

Sincerely,

DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs.

U.S. ENVIRONMENTAL PROTECTION AGENCY,
OFFICE OF GENERAL COUNSEL,
Washington, DC, September 17, 1999.

Hon. DAVID MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs, Committee on Government Reform and Oversight, U.S. House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: This is in response to your request for an assessment by EPA’s Office of General Counsel of the interpretation of the Knollenberg amendment offered in your letter of August 12, 1999.

As an initial matter, I wish to reiterate that the Administration will not implement the Kyoto Protocol without receiving the Senate’s advice and consent to ratification. As we have previously stated, the Administration believes the Knollenberg amendment is unnecessary in light of this commitment.

An assessment of your interpretation of the Knollenberg amendment must be based on the statutory language of that provision and the pertinent legislative history. The VA, HUD and Independent Agencies Appropriations Act prohibits EPA from using FY 1999 funds “to propose or issue rules, regulations, decrees, or orders for the purpose of implementation, or in preparation for implementation, of the Kyoto Protocol.” The Conference Report on this provision stated that: “[t]he bill lan-

guage is intended to prohibit funds provided in this bill from being used to implement actions called for solely under the Kyoto Protocol, prior to its ratification.”

EPA agrees with your observation that nothing in the Knollenberg amendment limits the Agency’s authority to propose or issue regulations that are mandated by the Clean Air Act or other existing laws. Your letter suggests, however, that the Knollenberg amendment somehow limits EPA’s authority to take *discretionary* regulatory actions that are otherwise authorized under our existing laws.

We can find nothing in the statutory language or legislative history that creates any such distinction between mandatory and discretionary actions. The amendment simply does not create such distinctions. Nothing in the language of the Knollenberg amendment suggests any prohibition on proposing or issuing regulations that implement existing authority and that have legitimate purposes under that authority, or any presumption as to what other purposes should be attributed to such actions.¹ EPA is aware of no doctrine of law that creates a presumption of illegitimacy for executive branch actions.² For these reasons, the General Accounting Office concluded in written testimony before your subcommittee that “an EPA activity justified by some other authority, even if it also facilitated the implementation of the protocol, would not be covered by this proviso.”³

Efforts to address the threat of global warming under the Clinton and Bush Administrations long predate adoption of the Kyoto Protocol. The United States became a party to the United Nations Framework Convention on Climate Change in 1994. Thus, the U.S. is obligated under the Convention to adopt policies and take measures to limit anthropogenic emissions of greenhouse gases. The U.S. implements such obligations consistent with relevant statutory authority.

Moreover, there are many actions that have the effect, or even the purpose, of *reducing greenhouse gases*, but not the *purpose of implementing the Kyoto Protocol*. As we have explained in previous letters, some regulatory actions addressed to conventional air quality objectives (e.g., measures to address emissions of nitrogen oxides or sulfur dioxide) can have the indirect effect of reducing greenhouse gases, depending on technological approaches that individual firms choose for compliance. Some provisions of the Clean Air Act authorize regulatory actions that directly address emissions of greenhouse gases (e.g., certain provisions of Title VI). None of these actions has the purpose of implementing or preparing to implement the Kyoto Protocol.

Finally, under the interpretation you propose, the Knollenberg amendment would effectively amend the Clean Air Act to eliminate portions of EPA’s authority to pursue important clean air goals unrelated to climate change. EPA sees no evidence in either the language or history of the amendment that Congress intended this straightforward language to sweep so broadly.

In short, EPA believes it has correctly interpreted, and is fully meeting, the requirements of the Knollenberg amendment.

Sincerely,

GARY S. GUZY,
General Counsel.

CONGRESS OF THE UNITED STATES,
Washington, DC, May 27, 1999.

Hon. JACOB J. LEW,
Director, Office of Management and Budget, Washington, DC.

DEAR DIRECTOR LEW: Thank you for providing an Office of Management and Budget (OMB) witness at the joint hearing on May 20, 1999, entitled “Global Climate Change: The Administration’s Compliance with Recent Statutory Requirements,” before the Senate Subcommittee on Energy Research, Development, Produc-

¹Nor does the legislative history support such a reading. For example, Congressman Knollenberg described the effect of the amendment in the following manner: “[w]e are not trying to cripple or cancel existing energy conservation programs or to curtail research development and demonstration programs for new, more efficient technologies or to *undermine existing environmental law.*” (Emphasis added.) 144 Cong. Rec. H 6565 (July 29, 1998).

²The courts, for example, judge an agency’s actions based on its statements in the record, and with a presumption of “administrative regularity,” not bad faith. See *Hercules Inc. v. EPA*, 598 F.2d 91, 123 (DC Cir. 1978); *Louisiana Ass’n of Independent Producers and Royalty Owners v. FERC*, 958 F.2d 1101, 1119 (DC Cir. 1992). Accord *Nat’l Nutritional Foods Ass’n v. FDA*, 491 F.2d 1141, 1145 (2d Cir. 1974), *cert denied*, *Nat’l Nutritional Foods Ass’n v. Schmidt*, 419 U.S. 874, 95 S.Ct. 135 (1974).

³See Statement of Peter F. Guerrero, Director, Environmental Protection Issues, Resources, Community, and Economic Development Division, General Accounting Office, before the Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs, House Committee on Government Reform (May 20, 1999).

tion and Regulation and the House Subcommittee on National Economic Growth, Natural Resources and Regulatory Affairs. During the hearing, Deidre A. Lee, Acting Deputy Director for Management, who was the OMB witness, agreed to respond promptly to followup questions and to provide additional information every two weeks, as it became available.

Please provide the information requested in this letter not later than June 18, 1999 to the Senate Subcommittee staff in Room 308 Dirksen Senate Office Building and the House Subcommittee staff in Room B-377 Rayburn House Office Building. If you have any questions, please contact Counsel Colleen Deegan at 224-8115 or Professional Staff Member Barbara Kahlow at 226-3058.

Thank you in advance for your attention to this request.

Sincerely,

DON NICKLES,
*Chairman, Subcommittee on Energy
Research Development, Production
and Regulation.*

DAVID M. MCINTOSH,
*Chairman, Subcommittee on Na-
tional Economic Growth, Natural
Resources and Regulatory Affairs.*

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF MANAGEMENT AND BUDGET,
Washington, DC, June 21, 1999.

Hon. DON NICKLES,
*Chairman, Subcommittee on Energy Research Development, Production and Regula-
tion, Committee on Energy and Natural Resources, U.S. Senate, Washington,
DC.*

DEAR MR. CHAIRMAN: This letter is in response to your May 27, 1999 letter to Director Lew. Your letter requested answers to follow-up questions from the May 20, 1999, hearing on Global Climate Change at which I testified.

Enclosed is a chart showing performance measures by budget line item in the format requested by Professional Staff Member Barbara Kahlow. Also, included is a table on historic funding for climate change programs. We are still working to complete the information and will send revised versions shortly. We will also transmit the responses to the follow-up questions.

We hope this information is helpful to your Subcommittee.

Sincerely,

DEIDRE A. LEE,
Acting Deputy Director for Management.

[Enclosures.]

[Enclosure 1]

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND AC-
TIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY
APPROPRIATION ACCOUNT

Appropriation account/line item	Performance goal
AGRICULTURE	
1. Agricultural Research Service—CCTI	In 2000, ARS will develop simulation models and data bases suitable for predicting the effects of global change on agricultural ecosystems and develop new molecular genetic technologies to improve crop tolerance to extreme environmental conditions.
2. Forest Service/Forest & Rangeland Research—CCTI	
3. Natural Resources Conservation Service/Conservation Operation—CCTI	
4. Agricultural Research Service—USGCRP	See USGCRP Goals 5-11, 17-21, and 22-28.

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
5. Cooperative State Research, Education, & Extension Services/Research & Education—USGCRP	See USGCRP Goals 5-11 and 22-28.
6. Economic Research Service—USGCRP	See USGCRP Goals 17-28.
7. Forest Service/Forest & Rangeland Research—USGCRP	See USGCRP Goals 17-28.
8. National Resources Conservation Service/Conservation Operations—USGCRP	See USGCRP Goals 17-28.
COMMERCE	
9. NIST/Scientific & Technical Research & Services—CCTI	See USGCRP Goals 17-28.
10. NOAA/Operations, Research & Facilities/Oceanic & Atmospheric Research—USGCRP	See USGCRP Goals 1-21.
11. NIST/Industrial Technology Services/PNGV—Other	
12. NIST/Scientific & Technical Research	
13. Under Secretary for Technology/Office of Technology Policy/PNGV—Other	
ENERGY	
14. Energy Conservation R&D—CCTI	<p>In 2000, train 10,000 State and local code officials, designers, and builders on the most recent energy-efficiency codes.</p> <p>In 2000, assist Building America partners in constructing 2,000 highly energy-efficient and cost-effective homes, and disseminate the results to builders of 15,000 other homes.</p> <p>In 2000, complete development and test prototype low-power sulfur lamps that can be twice as efficient as fluorescent lamps and 6-8 times as efficient as conventional incandescent lamps.</p> <p>In 2000, issue proposed and final rules on energy efficiency and test procedures for eight different categories of appliances.</p> <p>In 2000, demonstrate superinsulating materials with an R-50 rating per inch of thickness, and demonstrate prototype high-efficiency clothes dryers.</p> <p>By 2010, DOE's building technology programs will lead to reductions in greenhouse gas emissions of up to 36 million metric tons of carbon equivalent annually.</p> <p>In 2000, DOE will complete testing of prototype lithium-ion batteries for hybrid vehicles and select one or two R&D teams for full-size battery development.</p> <p>In 2000, DOE will initiate cooperative agreements with two medium- and heavy-truck engine development teams and, in the first year, demonstrate an 80 percent improvement in fuel economy, a 95 percent reduction in particulate, and a 30 percent reduction in nitrogen oxide emissions compared to current production engines.</p>

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
	<p>In 2000, the steel industry will develop residual element removal methods for steel ladles and technology for hot oxygen injection into blast furnaces will be commercialized.</p> <p>In 2000, DOE Industrial Assessment Centers will provide energy-analysis experience to 240 engineering students, will perform 750 assessments for small and medium-sized businesses, and will demonstrate information-sharing with NIST Manufacturing Extension Program centers.</p> <p>In 2000, the following technologies developed in the Industries of the Future program will be demonstrated: CCC immersion tubes for metalcasting; ultrasonic measurement system for steel manufacturing; uniform metal droplet manufacturing; first commercial unit from Solar Turbines under the Advanced Turbine Systems program; and next-generation thermal barrier coatings for industrial gas turbines.</p> <p>By 2010, Industries of the Future programs will support the development of technologies that are projected to save industry \$6 billion annually, and reduce annual carbon emissions by 29 million metric tons of carbon equivalent.</p> <p>In 2000, the steel industry will develop residual element removal methods for steel ladles and technology for hot oxygen injection into blast furnaces will be commercialized.</p> <p>In 2000, new mold-design guidelines for thin-wall iron casting will be made available to the metal-casting industry, and a neural-network model for cupola process-control will be demonstrated, potentially saving the industry 400 million Btus per year and reducing coke use and carbon dioxide emissions.</p> <p>In 2000, DOE Industrial Assessment Centers will provide energy-analysis experience to 240 engineering students, will perform 750 assessments for small- and medium-sized businesses, and will demonstrate information-sharing with NIST Manufacturing Extension Program centers.</p> <p>In 2000, the following technologies developed in the Industries of the Future program will be demonstrated: CCC immersion tubes for metalcasting; ultrasonic measurement system for steel manufacturing; uniform metal droplet manufacturing; first commercial unit from Solar Turbines under the Advanced Turbine Systems program; and next-generation thermal barrier coatings for industrial gas turbines.</p> <p>By 2010, Industries of the Future programs will support the development of technologies that are projected to save industry \$6 billion annually, and reduce annual carbon emissions by 29 million metric tons of carbon equivalent.</p>

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
15. Energy Supply/Solar & Renewable Energy—CCTI	<p>In 2000, DOE will demonstrate two 50-kW fuel cells integrated with fuel processing and/or sensors and controls for hybrid vehicle application.</p> <p>In 2000, DOE will complete component-level testing to achieve PNGV intermediate diesel engine emission targets of .3 g/mile of nitrogen oxides and .025 g/mile of particulate.</p> <p>By 2010, DOE will help develop and commercialize fuel efficiency and alternative-fuel technologies that reduce oil consumption by nearly 1 million barrels per day and reduce greenhouse gas emissions by 25 million metric tons.</p> <p>By 2020, these same technologies will reduce oil consumption by nearly 2 million barrels per day and reduce greenhouse gas emissions by 60 million metric tons.</p> <p>In 2000, DOE will achieve 1,000 hours of unattended operation of a single dish/Stirling (concentrating solar) system during field testing.</p> <p>In 2000, the Million Solar Roofs initiative will have added 26,000 new systems, bringing the total to 51,000 systems.</p> <p>In 2000, thin-film photovoltaics module efficiency will reach 13 percent in prototype CIS or CdTe modules.</p> <p>In 2000, DOE will demonstrate sustained operation of the complete Vermont gasification system, complete the powerplant retrofit in Chariton Valley (IA) to allow co-firing of coal with switchgrass, and complete a national resource database for biomass crops and residues.</p> <p>In 2000, U.S. wind-power generating capacity (using many technologies developed by DOE) will increase from 1,859 megawatts on-line in 1998 to 2,300 megawatts on-line.³</p> <p>In 2000, DOE will complete a 5 megawatt Kalina Cycle demonstration geothermal plant.³</p> <p>In 2000, DOE will demonstrate a solar-to-hydrogen conversion efficiency of more than 12 percent using a tandem photo electrolytic cell (similar to photovoltaic solar cell), and demonstrate a 3-fold increase in hydrogen production at 15 atmospheres using photosynthesis bacteria.³</p> <p>By 2010, DOE's renewable energy programs are expected to replace up to 1.2 Quads of energy and reduce annual carbon emissions by nearly 24 million metric tons of carbon equivalent.</p>
16. Energy I Supply/Nuclear Supply—CCTI	<p>In 2000 and beyond, this DOE program will help offset carbon emissions of more than 150 million metric tons of carbon equivalent per year by helping to ensure the continued safe operation of nuclear power plants.</p>
17. Fossil Energy R&D—CCTI	
18. Science/Basic Energy Science—CCTI	
19. Energy Information Agency—CCTI	

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
20. Science/Biological & Environmental Research—USGCRP	See USGCRP Goals 1-34.
21. Energy Conservation R&D/Weatherization & State Energy Grants—Other	In 2000, DOE will provide State grants to weatherize approximately 76,900 low-income homes, saving 25 percent of home heating energy and 7 trillion Btus per year.
22. Energy Supply/Nuclear Energy R&D/Nuclear Energy Research Initiative (NERI)—Other	
23. Fossil Energy R&D/coal/efficient combustion & utilization—Other	
24. Fossil Energy R&D/natural gas/efficient combustion & utilization—Other	
HHS	
25. NIH/National Cancer Institute—USGCRP	See USGCRP Goals 29-34.
26. NIH/National Eye Institute—USGCRP	See USGCRP Goals 29-34.
27. NIH/National Institute of Arthritis & Musculoskeletal & Skin Disorders—USGCRP	See USGCRP Goals 29-34.
28. NIH/National Institute of Environmental Health Sciences—USGCRP	See USGCRP Goals 29-34.
HUD	
29. Research & Technology/PATH—CCTI	
INTERIOR	
30. USGS/Surveys, Investigations, & Research—USGCRP	See USGCRP Goals 1-4, and 17-28.
STATE	
31. International Assistance Programs/International Organizations & Programs/Climate Stabilization Fund—Other	In 2000, the U.S. will achieve its UNFCCC objectives if Parties to the Convention continue to move forward on the Buenos Aires Action Plan, and if more developing countries volunteer to take more serious steps on climate change, including adopting emission targets. ³ In 2000, work on the IPCC third assessment report proceeds smoothly and the three IPCC technical reports meet U.S. objectives and are completed on time.
TRANSPORTATION	
32. NHTSA/Operations & Research/PNGV—Other	
TREASURY	
33. Tax Incentives—CCTI	Not required by GPRA.
34. International Development Assistance/Multilateral Assistance/Contributions to the International Bank for Reconstruction & Development/Global Environment Facility—Other	In 2000, the GEF will expand climate change projects in high-emissions developing countries. ³ In 2000, the GEF, where practical, will follow World Bank procurement procedures. ³ In 2000, the Secretariat, implementing agencies, and Scientific Technical Advisory Panel document best practices for stakeholder involvement. ³

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
	<p>In 2000, the Secretariat with Scientific Technical Advisory Panel develops geographic priorities for global impacts.³</p> <p>In 2000, the GEF will work with microfinance specialists to develop strategy for financing environmentally sustainable livelihoods in conservation areas.</p>
AID	
35. Development Credit Authority/subsidy BA—Other	<p>In 2000, USAID-assisted activities in developing countries will reduce greenhouse gas emissions by 1.5 million metric tons of carbon equivalent.³</p> <p>In 2000, USAID-assisted activities will protect or conserve over 15 million hectares of land where carbon is stored.</p>
	<p>In 2000, USAID will expand climate-related activities in its agriculture, biodiversity, forestry, energy, and urban programs in existing countries and will address climate change in at least four more developing or transition countries.³</p> <p>In 2000, USAID will sponsor at least five training workshops on greenhouse gas emission inventories and mitigation analysis to educate host country personnel.</p>
36. Sustainable Development Assistance— Other	<p>In 2000, USAID-assisted activities in developing countries will reduce greenhouse gas emissions by 1.5 million metric tons of carbon equivalent.³</p> <p>In 2000, USAID-assisted activities will protect or conserve over 15 million hectares of land where carbon is stored.³</p> <p>In 2000, USAID will expand climate-related activities in its agriculture, biodiversity, forestry, energy, and urban programs in existing countries and will address climate change in at least four more developing or transition countries.³</p> <p>In 2000, USAID will sponsor at least five training workshops on greenhouse gas emission inventories and mitigation analysis to educate host country personnel.</p>
EPA	
37. Environmental Programs & Management— CCTI	<p>In 2000, EPA's buildings programs (residential and commercial) will reduce emissions of greenhouse gases by 12.7 million metric tons of carbon equivalent annually.³</p> <p>In 2000, EPA's buildings programs will reduce energy consumption by more than 53 billion kilowatt hours, resulting in over \$4 billion in energy savings to participating consumers and businesses. This is an increase of nearly 12 billion kilowatt hours and \$1 billion in annual energy savings in residential and commercial buildings over 1999.³</p> <p>In 2000, EPA's transportation programs will help reduce greenhouse gas emissions by almost 5.7 million metric tons of carbon equivalent.³</p> <p>In 2000, EPA's programs in the industrial sector will reduce greenhouse gas emissions, by 37.9 million metric tons of carbon equivalent annually.³</p>

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
	<p>In 2000, EPA's climate change programs serving State and local governments will reduce greenhouse gas emissions by 1.7 million metric tons of carbon equivalent annually.³</p> <p>By 2010, EPA will have helped key developing countries take actions that reduce projected greenhouse gas emissions in these countries by at least 5 percent.</p>
38. Science & Technology—CCTI	<p>In 2000, EPA will demonstrate technology for a 70 mile per gallon, mid-size family sedan that has low emissions and is safe, practical, and affordable.</p>
39. Science & Technology—USGCRP	See USGCRP Goals 22-34.
40. State & Tribal Assistance Grants/Clean Air Partnership Fund—Other	
NASA	
41. Science, Aeronautics & Technology—USGCRP	See USGCRP Goals 1-28.
NSF	
42. Research & Related Activities—USGCRP	See USGCRP Goals 1-39.
43. Research & Related Activities/PNGV—Other	<p>Successful when NSF awards lead to important discoveries; new knowledge and techniques, both expected and unexpected, within and across these boundaries.³</p> <p>Minimally effective when there is a steady stream of outputs of good scientific quality.³</p> <p>Successful when the results of NSF awards are rapidly and readily available and feed, as appropriate, into education, policy development, or use by other federal agencies or the private sector.³</p> <p>Minimally effective when results of NSF awards show the potential for use in service to society, and when activities designed to enhance connection between discoveries and their use in service to society meet the successful standard.</p>
	<p>Successful when participants in NSF activities experience world-class professional practices in research and education, using modern technologies and incorporating international points of reference; when academia, government, business, and industry recognize their quality; and when the science and engineering workforce shows increased participation of under represented groups.³</p> <p>Minimally effective when opportunities and experiences of students in NSF-sponsored activities are comparable to those of most other students in their fields; and when the participation of under represented groups in NSF-sponsored science and engineering projects and programs increases.</p>
SMITHSONIAN	

PERFORMANCE MEASURES FOR CLIMATE CHANGE PROGRAMS AND ACTIVITIES IN THE PRESIDENT'S APRIL 1999 REPORT TO CONGRESS, BY APPROPRIATION ACCOUNT—Continued

Appropriation account/line item	Performance goal
44. S&E—USGCRP	See USGCRP Goals 1-11, and 17-39.
TOTAL	

U.S. GLOBAL CHANGE RESEARCH PROGRAM

KEY PERFORMANCE GOALS

Understanding the earth's climate system

1. In 2000, the USGCRP will develop and publish a summary that synthesizes the state of knowledge of the relationship between El Nino cycles and longer-term anthropogenic climate change as input to the international assessment of climate change being conducted by the Intergovernmental Panel on Climate Change for its Third Assessment Report, to be completed in 2001.

2. In 2000, the USGCRP will develop improved El Nino/La Nina forecasts based on models that incorporate other important multiple-time scale phenomena, particularly: 1) the longer-term anthropogenic component of the climate system; 2) the decadal variability within the ENSO cycle; and 3) the influence of subseasonal phenomena such as the Madden-Julian Oscillation on the development of ENSO events. Forecasts will improve both in terms of accuracy and in terms of regional specificity.

3. In 2000, the USGCRP will demonstrate how climate variability associated with the ENSO phenomenon is manifested in localized extreme weather events, such as storms and floods.

4. In 2000, the USGCRP will document quantitative and qualitative savings/gains resulting from the use of integrated regional weather and climate forecasts.

Composition and chemistry of the atmosphere

5. In 2000, the USGCRP will examine the chemistry of the stratosphere at high northern latitudes in winter, with the objective of determining the potential for ozone depletion in the Arctic. The study will use combined balloon and airborne measurements together with observations from an instrument currently planned for launch in late 1999 aboard a Russian satellite.

6. In 2000, the USGCRP will carry out significant modeling work in support of the Intergovernmental Panel on Climate Change (IPCC). Third Assessment Report, to be completed in 2001. These modeling efforts will help to simulate prior evolution of atmospheric trace constituents and aerosol composition and to forecast its future evolution. The output from these model runs will be used by climate modeling groups in their simulations of the future climate.

7. In 2000, the USGCRP will examine contributions to trace constituent and particulate composition of the atmosphere over South Africa and their effect on atmospheric radiation. The ground- and aircraft-based data will also be used to help validate data products on aerosol and trace gas distributions obtained by space borne instruments launched in 1999 as part of the Earth Observing System.

8. In 2000, the USGCRP will create a climatology of variations in tropical ozone using an enhanced suite of measurements of vertical profiles of tropospheric ozone in the tropics and southern subtropics. The data should provide a unique capability for the validation of tropical ozone columns derived from satellite data.

9. In 2000, the USGCRP will have obtained surface UV flux data from the fully-implemented USGCRP ground-based UV monitoring network. These data, making use of some 60 instruments at some 50 locations, will be provided to researchers investigating biological response to ultraviolet radiation. UV flux data for other regions of the earth will be available from satellite-based techniques.

10. In 2000, the USGCRP will provide extended and updated data sets on the global methane budget, using a combination of long-term surface-based measurements showing unexplained interannual variations in growth rate and newly-obtained total column methane observations made from a space-based instrument launched in 1999 as part of the Earth Observing System.

11. In 2000, the USGCRP will carry out detailed studies of new data on the distribution and composition of aerosols in the global troposphere, based on a combination of ground-, ship-, airborne-, and space-based data; and will integrate these data into global numerical models designed to simulate aerosol formation, transport, and interaction with surrounding meteorology.

The global water cycle

12. In 2000, the USGCRP will demonstrate skill in predicting changes in water resources and soil moisture on time scales up to seasonal and annual as an integral part of the climate system. This will include quantification of evaporation, precipitation, and other hydrological processes as required to improve prediction of regional precipitation over periods of one to several months.

13. In 2000, the USGCRP will demonstrate the ability to determine radiative fluxes and diabatic heating within the atmosphere and at the surface with the precision needed to predict transient climate variations and to understand natural and anthropogenically-forced climate trends.

14. In 2000, the USGCRP will establish a climatologically valid database of 60 months of rainfall data from various ground validation radar sites and will achieve 10% agreement among the various TRMM-related sensors for zonally averaged monthly rainfall accumulations.

15. In 2000, the USGCRP will complete cloud model simulations of major storm systems in the Brazilian Amazon and at the Kwajalein atoll oceanic site for the purpose of testing latent heating estimates from TRMM.

16. In 2000, the USGCRP will assess the accuracy of remote and in-situ humidity measurements, and improve understanding of the climate consequences of water vapor radiation feedback. This will include a field experiment at the DOE radiation testbed facility in Oklahoma, under joint NASA and DOE sponsorship.

Carbon cycle science

17. In 2000, the USGCRP will produce a state of the science report assessing the magnitude, location, and cause of the North American terrestrial sink from available data, and a research strategy for addressing uncertainties in the terrestrial sink estimates that are not reconcilable with current data.

18. In 2000, the USGCRP will implement integrated observation, research and modeling activities to provide more accurate information on the location, magnitude and cause of the North American terrestrial sink based on these identified uncertainties.

19. In 2000, the USGCRP will produce a synthesis of global ocean carbon dioxide data, enabling the design of a research strategy for monitoring changes and identifying variability in the oceanic sink.

20. In 2000, the USGCRP will work to improve the parameterization of key processes controlling carbon storage, such as air-sea gas exchange, a major uncertainty in ocean sink estimates.

21. In 2000, the USGCRP will produce a long-term, integrated monitoring strategy for carbon measurements in the atmosphere, ocean, and land ecosystems.

Biology and biochemistry of ecosystems

22. In 2000, the USGCRP will continue developing and publishing inventories and models of terrestrial ecosystems that will be used to better predict how ecosystems are affected by multiple environmental stressors.

23. In 2000, the USGCRP will document land-use and land-cover change in regions where rapid change could potentially alter the sensitivities/vulnerabilities of the region to climate change.

24. In 2000, the USGCRP will determine how climate change, vegetation management practices, and disturbance affect the spread of exotic plants and the regeneration of native plants at high elevation.

25. In 2000, the USGCRP will understand the influence of changing precipitation and nutrient cycling patterns on species regeneration and composition, and the resulting consequences for forest growth, decomposition processes, carbon sequestration and sustain ability.

26. In 2000, the USGCRP will develop and apply, using tools of molecular biology, gene probes for key enzymes linking the carbon and nitrogen cycles in marine microbes.

27. In 2000, the USGCRP will develop methods that assess the invasiveness of nonindigenous species by combining the science of landscape ecology with the principles of risk assessment. These methods will be used to identify those areas in the U.S. that may be vulnerable to nonindigenous species due to climate change and variability.

28. In 2000, the USGCRP will use ecosystem-scale experiments involving increased CO₂ and other environmental factors to determine how atmospheric change and potential climatic change may affect forest productivity, forest health, and species distributions.

Human dimensions of global change

29. In 2000, the USGCRP will demonstrate the importance of assessments research to the analysis of options for coping with the risks posed by climate variability and change. The regional scale of investigation will serve as a means for studying global to local influences in an integrated framework, understanding human and ecosystem vulnerability, developing innovative methods for assessing regional consequences, and the systematic integration of global change research. By FY 2000, regional efforts will cover the United States and provide a strong framework for a continued process of assessment, decision support, and analysis.

30. In 2000, the USGCRP will help to focus science priorities on several topics now receiving broader attention-aerosols, low-probability/high-consequence events, impacts in unmanaged ecosystems, and the contribution of technology innovation. By FY 2000, many integrated assessment models will include a representation of greenhouse gases other than CO₂, carbon dioxide sinks, and carbon leakage (Moving carbon emissions from countries with stringent controls to countries with little or no control).

31. In 2000, the USGCRP will provide improved information and analysis supporting efforts to foresee disaster and identify opportunities associated with climate through joint sponsorship of new research in Human Vulnerability to Climate Risk and Environmental Surprise.

32. In 2000, the USGCRP will address the needs of decision makers concerned about resource use, demographic trends, and adaptation to change through joint support of investigation focused on the connection between human activities influencing land practices and environmental conditions.

33. In 2000, the USGCRP will demonstrate the relationship of heat-related mortality and illnesses due to anticipated increases in the intensity and duration of heat waves.

34. In 2000, the USGCRP will include Masters-level to post-doctoral candidates on multi-disciplinary research teams.

Paleoenvironment/paleoclimate

35. In 2000, the USGCRP will have completed the first global synthesis of paleoclimate within the context of global change research. The international research community will focus on establishing and understanding the temporal and spatial range of natural climate variability during the period prior to significant anthropogenic impact, and initiate the use of the paleorecord for the improvement of the predictive ability of climate and environmental system models.

36. In 2000, the USGCRP will have established a global network of centuries-long paleoclimatic time series and develop the statistical methodologies to link disparate sedimentological, paleobiological, and geochemical data. This will permit the characterization of mechanisms of interregional coupling and establish the sequence and phasing of major climatic transitions at the sub-decadal to century scale.

37. In 2000, the USGCRP will evaluate the hypothesis that the Arctic is one of the most sensitive regions for climate and environmental change, has undergone large changes over the last 1000 years and, in magnitude and extent, is currently undergoing an unprecedented warming. Also, work will have begun to develop and evaluate coupled atmospheric/oceanic/sea-ice climate models and high-resolution regional models to advance our understanding of the dynamic Arctic environment and its climatic linkages to the lower latitudes.

38. In 2000, USGCRP researchers will focus on characterizing the history of the warm pool in the tropical Pacific Ocean over the last 200-300 years. Researchers will establish the history of significant changes in surface temperature and/or areal extent of this water mass under varying climatic states. This information will be essential for understanding global climate dynamics and testing models under different boundary conditions.

39. In 2000, the USGCRP will have a much clearer understanding of climate-induced vegetation and ecosystem change over the last 20,000 years, particularly in North America. This knowledge will help improve estimates of future climate-induced vegetation and ecosystem change, as well as possible biophysical and biochemical feedbacks to the climate.

[Enclosure 2]

DETAILED ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES BY APPROPRIATION ACCOUNT/LINE ITEM

[Discretionary budget authority and tax incentives; in millions of dollars]

	FY 1993 Actual	FY 1994 Actual	FY 1995 Actual	FY 1996 Actual	FY 1997 Actual	FY 1998 Actual	FY 1999 Estimate	FY 2000 Proposed
Programs and Tax Policies Directly Related to Global Climate Change								
Department of Energy (DOE)								
Energy Supply	249	318	361	268	244	272	336	404
Solar and Renewable Energy R&D	(249)	(318)	(361)	(268)	(244)	(272)	(336)	(399)
Nuclear Energy (NEPO)	(--)	(--)	(--)	(--)	(--)	(--)	(0)	(5)
Energy Conservation R&D	346	435	468	415	414	457	526	647
Fossil Energy R&D							24	37
Science (Basic Science)							14	33
Energy Information Administration							3	3
Subtotal—DOE	595	753	829	683	658	729	902	1,124
Environmental Protection Agency (EPA)								
Environmental Programs and Management		35	91	81	70	73	72	166
Science and Technology		8	11	15	16	17	37	50
Subtotal—EPA		43	102	96	86	90	109	216
Department of Agriculture (USDA)								
Agricultural Research Service							0	7
Natural Resources Conservation Service Conservation Operations								3
Forest Service—Forest and Rangeland Research							0	6
Subtotal—USDA							0	16
Department of Housing & Urban Development (HUD)								
Research and Technology (PATH)							10	10

Department of Commerce (DOC)								
National Institute of Standards and Technology (NIST) Scientific and Technical Research and Services							0	2
Subtotal—Spending Programs	595	796	931	779	744	819	1,021	1,368
<hr/>								
Revenue Effect of Tax Incentives ¹							0	383
<hr/>								
U.S. Global Change Research Program (USGCRP)								
Department of Health and Human Services (HHS)								
National Institutes of Health (NIH)								
National Institute of Environmental Health Sciences						4	4	5
National Eye Institute						9	10	11
National Cancer Institute						21	25	25
National Institute of Arthritis & Musculoskeletal & Skin Diseases						*	*	*
Subtotal—HHS/NIH ²						35	40	40
<hr/>								
National Aeronautics and Space Administration								
Science, Aeronautics, and Technology	888	999	1,305	1,218	1,218	1,210	1,177	1,219
Department of Energy								
Science (Biological & Environmental Research)	118	118	113	113	109	106	114	125
National Science Foundation								
Research and Related Activities	124	142	169	163	166	167	182	187
Department of Agriculture (USDA)								
Agricultural Research Service	17	18	24	24	26	27	26	34
Cooperative State Research, Education, & Extension Services—Research and Education	11	12	10	10	12	7	10	16
Economic Research Service	1	1	1	1	1	1	1	2
Natural Resources Conservation Service Conservation Operations	2	2	2	2	1	1	2	14
Forest Service—Forest and Rangeland Research	24	23	23	15	17	17	17	23
Subtotal—USDA ³	55	56	60	52	57	53	55	89
<hr/>								
Department of Commerce								
National Oceanic and Atmospheric Administration—Operations, Research, and Facilities	66	63	57	57	60	60	63	70

[Enclosure 2]—Continued
 DETAILED ACCOUNTING OF FEDERAL CLIMATE CHANGE EXPENDITURES BY APPROPRIATION ACCOUNT/LINE ITEM

[Discretionary budget authority and tax incentives; in millions of dollars]

	FY 1993 Actual	FY 1994 Actual	FY 1995 Actual	FY 1996 Actual	FY 1997 Actual	FY 1998 Actual	FY 1999 Estimate	FY 2000 Proposed
Department of the Interior								
U.S. Geological Survey—Surveys, Investigations, and Research	22	29	27	26	26	26	27	27
Environmental Protection Agency								
Science and Technology	26	30	22	18	13	13	17	23
Smithsonian Institution								
Salaries and Expenses	7	7	7	7	7	7	7	7
Subtotal—USGCRP ⁴						1,677	1,682	1,787
International Assistance								
Agency for International Development (AID).								
Sustainable Development Assistance ⁵	200	173	192	175	147	163	150	150
Development Credit Authority (subsidy budget authority)							0	5
Subtotal—AID	200	173	192	175	147	163	150	155
Department of State								
International Assistance Programs—International Organizations and Programs	1	1	1	3	3	5	7	8
Subtotal—International Assistance	201	174	193	178	150	168	157	163
Environmental Protection Agency								
State and Tribal Assistance Grants—Clean Air Partnership Fund								200
Department of Energy								
Energy Conservation R&D—Weatherization & State Energy Grants						155	166	191
Fossil Energy R&D								
Coal—efficient combustion & utilization	186	166	144	120	101	105	123	122
Natural gas—efficient combustion & utilization ⁶	64	76	87	92	100	91	98	87

Nuclear Energy R&D—Nuclear Energy Research Initiative (NERI) ..						0	19	25
Subtotal—DOE						351	406	425
Department of the Treasury								
International Development Assistance, Multilateral Assistance, Contributions to the International Bank for Reconstruction & Development—Global Environment Facility ⁷	12	35	14	14	18	75	56	
Partnership for a New Generation of Vehicles (PNGV)—non-CCTI funding ⁸								
Department of Commerce (DOC)								
Under Secretary for Technology/Office of Technology Policy—Salaries and Expenses		0	1	1	1	1	1	1
National Institute of Standards and Technology								
Scientific and Technical Research and Services		7	7	7	6	6	6	6
Industrial Technology Services		56	48	34	22	18	5	
Subtotal—DOC		63	56	42	29	25	12	
National Science Foundation								
Research and Related Activities ⁹		53	53	56	47	49	51	
Department of Transportation								
National Highway Traffic and Safety Administration (and FTA prior to FY 1999) Operations and Research		5	6	13	5	3	4	
Subtotal—Other Climate Change-Related Programs					450	558	748	
Total—All Programs and Tax Policies					3,114	3,418	4,449	

Note: This table is a detailed listing of Federal climate change expenditures by agency with account level information as provided in the President's FY 2000 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.

A* Less than \$500,000.

¹ First year of a proposed five-year, \$3.6 billion package of tax incentives.

² Total will not add due to rounding.

³ USDA funding for FY 1999 and FY 2000 has been revised since publication of the President's FY 2000 Budget (Table 7-3, Page 112, Budget Volume).

⁴ Total will not add due to rounding.

⁵ Includes funds from the Economic Support Fund, Support for Eastern European Democracy and, the newly Independent States accounts.

⁶ Funding for natural gas includes turbines, emerging processing technology, and fuel cells.

⁷The total FY 2000 request for the Global Environment Facility (GEF) is \$143 million. Approximately 38.8% of total GEF funding from all sources since inception in 1991 has supported climate-related projects. The U.S. does not allocate funds to the GEF by project type. The table shows the portion of U.S. annual contributions to the GEF prorated using the aggregate 38.8% figure. FY 1999 funding can only be used for arrears.

⁸PNGV was not defined prior to FY 1995. Relevant work was performed in the DOE Energy Conservation program and is included in that line earlier in this table.

⁹NSF criteria for counting PNGV funding was changed in FY 1998, so data before that period are not exactly comparable.

HOUSE OF REPRESENTATIVES,
COMMITTEE ON GOVERNMENT REFORM,
Washington, DC, June 24, 1999.

Hon. JACOB J. LEW,
Director, Office of Management and Budget, Washington, DC.

DEAR DIRECTOR LEW: This letter comments on the Office of Management and Budget's (OMB's) June 21, 1999 incomplete response to the May 27th follow-up questions sent after the May 20th joint House/Senate hearing on "Global Climate Change: The Administration's Compliance with Recent Statutory Requirements." Frankly, OMB's incomplete response is unacceptable for several very basic reasons. First, OMB's response does not fully address any of my 15 questions. Stating that "We are still working to complete the information and will send revised versions shortly" is small consolation. Congress is already far along in the appropriations process. The very specific and detailed questions we sent you are designed and intended to assist the appropriators in deciding how best to spend the people's tax dollars. If OMB waits much longer to answer the questions, it will be too late to inform public and Congressional debate over funding for the Administration's climate change policies.

Second, Congress requested an identification of performance measures, not performance goals, for each of the 44 line items with requested climate change funding in Fiscal Year (FY) 2000 so that these measures could be considered in this year's appropriations process. The Government Performance and Results Act requires performance measures, not goals, since goals often do not reveal measurable results. For example, OMB's Enclosure 1 includes the following performance goals for the requested Global Environment Facility (GEF) funding: "expand climate change projects in . . . developing countries," "where practical . . . follow World Bank procurement procedures," "document best practices," "develops geographic priorities," and "develop strategy." These are not even output measures, much less intermediate outcome measures or final outcome measures.

Third, we question if there may some double counting of expected results in OMB's Enclosure 1, e.g., for the Agency for International Development's two line items (#35 and 36), both of which are claiming emissions reductions of 1.5 million metric tons of carbon equivalent.

Fourth, there are neither any performance measures nor any performance goals for the President's new \$200 million Clean Air Partnership Fund. How does the Administration expect Congress to even consider funding for this new initiative without performance measures?

Finally, OMB's Enclosure 2, entitled "Detailed Accounting of Federal Climate Change Expenditures by Appropriation Account/Line Item," does not include any totals for FYs 1993-1997. We understand that OMB did not include totals because it has not yet fully identified the funding for climate change in these years. Congress needs this information during this year's appropriations process to properly consider the President's FY 2000 funding requests for climate change funding in 14 different agencies.

If you have any questions about this request, please call Subcommittee Professional Staff Member Barbara Kahlow at (202) 226-3058.

Thank you in advance for your attention to this request.

Sincerely,

DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs.

EXECUTIVE OFFICE OF THE PRESIDENT,
OFFICE OF MANAGEMENT AND BUDGET,
Washington, DC, July 2, 1999.

Hon. DAVID M. MCINTOSH,
Chairman, Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs, Committee on Government Reform and Oversight, U.S. House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: This letter is a follow-up to my letter of June 21, 1999, and transmits all of the information requested at the May 20, 1999, hearing on climate change at which I testified. This letter also responds to questions in your June 24, 1999, letter to Director Lew.

Enclosed are responses to the questions submitted for the record from you and Senators Nickles, Graham, and Murkowski that were transmitted in your letters of

May 27 and 28, 1999. Also included is a final table on historic funding for climate change-related programs by appropriation account/line item for fiscal years 1993 through 1997. A final chart showing performance information by appropriation account/line item in the format requested by Professional Staff Member Barbara Kahlow is also enclosed. The chart also clarifies a couple of issues raised in your June 24th letter.

Most of the performance goals in the chart are taken from the Report to Congress. The Report was transmitted to Congress in response to language in several FY 1999 appropriation bills and reports, including the Senate Treasury and General Government Committee Report which requested we include "performance goals" in the report. We also included performance goals in the chart for the category of programs listed in the Report that are related to climate change, but exist primarily for another purpose or have multiple environmental benefits. Both the funding table and performance chart replace the table and chart sent to you in my June 21, 1999, letter.

We hope this information is helpful to the Subcommittee in its work to review the President's climate change initiative.

Sincerely,

DEIDRE A. LEE

Acting Deputy Director for Management.

[Enclosures]

RESPONSES TO QUESTIONS FROM SENATOR NICKLES AND REPRESENTATIVE MCINTOSH

Question 1a. Please explain why OMB did not submit the Foreign Operations-related report on climate change, which Congress directed the Administration to submit with the President's Budget on February 1, 1999, until April 20, 1999.

Answer. The Administration takes seriously requirements to provide information and reports to Congress to assist it in its oversight responsibilities. While we sought to transmit the Report to Congress at the time requested, the breadth of funding and performance information needed to comply with the requirements in various appropriations bills and reports required coordination with ten or more agencies, and took longer than expected. Also, the timing and preparation of annual plans by the agencies impacted the development and transmittal of the Report. Some agencies transmit their annual plans to Congress on the same date the President's Budget is transmitted, while other agencies submit their annual plans several weeks after the President's Budget is submitted.

Question 1b. Please explain why this report does not include one or more program performance measures for most of the 44 line item Budget accounts with climate change funding across 14 Federal agencies. When will these measures be available for Congress to consider in this year's appropriations process so that the American people can understand what results they would get for their tax dollars?

Answer. The Report includes 78 performance goals—as noted by the General Accounting Office in its review of the Report—related to the Climate Change Technology Initiative, the Global Change Research Program, and international assistance programs. (See Enclosure 1 for performance goals cross-referenced with the appropriation accounts.) In the few cases where there are not performance goals, either the funding is a small amount of a much larger appropriation and does not merit a separate performance goal, or the program is new and performance goals have yet to be developed. In other cases, the performance goals listed are a subset of the goals for the program (See for example, "Our Changing Planet" for additional goals related to the Global Change Research Program).

All of the performance goals in the Report to Congress are discussed in more detail in individual agency budget justifications and annual plans submitted to Congress earlier this year. In addition, the Report did not include performance goals for six programs listed in the other climate-related category because these programs exist primarily for another purpose or have multiple environmental benefits, and may not have performance goals related to climate change. However, we have included some of the performance goals for other climate-related programs in Enclosure 1.

Question 2. The President's February 1st Budget request and the President's April 20th report to Congress indicate that the total requested funding for climate change programs and activities in FY 2000 is \$4.4 billion, including over a \$1 billion requested increase from the FY 1999 level.

Question 2a. Please provide the total level of funding for all climate change programs and activities for each of the preceding five years, the budget year, and each of the next four outyears, i.e., for each year from and including FY 1995 through FY 2004.

Answer. Enclosure 2 provides funding for the climate change programs and activities included in the Report to Congress for the period FY 1993 through FY 2000. The President's Budget does not include information on a program level for the period FY 2001 through FY 2004.

Question 2b. Does the White House initiative still call for a \$6.3 billion increase in funding over five years? Is this increase still measured from FY 1999 to FY 2003? If not, what is the total increase in funding over five years and for which five-year period?

Answer. For most discretionary programs, the President's FY 2000 Budget does not include outyear information at the program level. However, it is the Administration's current intention to budget for the Climate Change Technology Initiative in the outyears consistent with the policy goals announced in the FY 1999 President's Budget.

Question 2c. Why did OMB not include outyear information for climate change programs and activities in the President's FY 2000 budget?

Answer. For most discretionary programs, the President's FY 2000 Budget does not reflect specific policy decisions or project specific dollar amounts for the years beyond 2000. However, the President remains fully committed to the policy goals he has set for the outyears in the FY 2000 Budget.

Question 3a. What is OMB's view of an acceptable performance measure of acceptable results? How does OMB define "output" and "outcome" measures?

Answer. A performance measure of expected results may be either an outcome or output goal (See definitions below). A measure of input is not a measure of results. Because of difficulties in directly associating or attributing an agency's programs to an ultimate effect, measures of impact are rarely included in agency plans developed under the Government Performance and Results Act (GPRA).

OMB includes the following definitions of outcome and output goals in its Circular A-11:

Outcome goal: A description of the intended result, effect, or consequence that will occur from carrying out a program or activity.

Output goal: A description of the level of activity or effort that will be produced or provided over a period of time or by a specified date, including a description of the characteristics and attributes (e.g., timeliness) established as standards in the course of conducting the activity or effort.

For research programs, however, the intended result or consequence is generally not known in advance. Therefore, we use some flexibility in applying these definitions to specific programs.

Circular A-11 also defines performance measure as "a performance goal or performance indicator". Thus, the terms performance measure and performance goal are sometimes used interchangeably.

Question 3b. Using these definitions, please identify—by line item/appropriation account—all output and outcome measures in the April 20th report.

Answer. See Enclosure 1 for the list of all output and outcome goals in the Report to Congress.

Question 3c. Does OMB believe that the limited number of output, and the absence of any outcome performance measures identified in the report are sufficient to ensure results for the dollars expended, especially across 14 agencies and 44 appropriations accounts? If so, please explain why.

Answer. We believe the 78 performance goals included in the Report provide sufficient information with which to evaluate the President's request for climate change. There is additional information on these programs in agency budget justifications and annual plans that is very detailed. Agencies also provide the appropriations and oversight committees with written answers to specific questions about the President's Budget. In addition, specific funding and performance information related to the Global Change Research Program is available in the report "Our Changing Planet", which was transmitted to Congress earlier this year.

Question 3d. What performance measures were added by OMB to the 14 agencies' small number of proposed measures? If none, why?

Answer. With respect to OMB's involvement in the development of performance goals for the Report to Congress, nearly every office within OMB is engaged to some degree in working with agencies as they prepare the plans and reports required by the Government Performance and Results Act (GPRA). However, we do not maintain a count of goals added or modified at the suggestion of OMB staff. We believe the agencies have made great progress in producing plans that are both used and useful, and that OMB's efforts have significantly helped toward that end. In OMB's view, the FY 2000 annual performance plans were, on the whole, markedly better than their FY 1999 counterparts, and OMB will work with agencies to ensure further improvement in the FY 2001 annual plans.

Question 4. Why did OMB propose in the President's FY 1999 Budget to remove the Knollenberg VA-HUD limitation on rulemaking until the Administration submits and then the Senate ratifies the Kyoto Protocol?

Answer. As stated in the footnote on Page 928 of the President's FY 2000 Budget Appendix, the Administration proposed deleting the language related to the Kyoto Protocol in the Environmental Protection Agency's Environmental Programs and Management Account for reasons that are primarily institutional and precedential in nature. As the Administration has stated on several occasions, it has no intention of taking any actions that would implement the Kyoto Protocol prior to ratification by the Senate. Therefore, the Administration considered the language to be unnecessary.

Question 5a. In light of the statutory limitation in the 1999 VA-HUD Appropriations Act, will OMB clear any agency regulatory submissions (including proposed, interim final and final rules) that have the effect of reducing greenhouse gas emissions prior to Senate ratification of the Kyoto Protocol?

Question 5b. If so, what criteria would OMB use to ensure compliance with this statutory limitation?

Answer. The Administration has stated on several occasions that it will not implement the Kyoto Protocol prior to ratification by the Senate. The Administration also will abide by the language in the FY 1999 VA/HUD Appropriations Act related to implementing the Kyoto Protocol. In the case of regulations authorized by current law, we plan continued OMB review of agency regulations under the provisions of E.O. 12866. Some of these regulations may have incidental (or ancillary) effects on greenhouse gas emissions.

Question 6a. In the House Subcommittee's review of the agencies' documents responsive to the House Subcommittee's March 1998 oversight letters to the agencies about the Administration's global climate change initiative, OMB's then Program Associate Director T.J. Glauthier was revealed as a principal in the planning and decisionmaking process in 1997 and 1998, especially regarding the level of funding for the various Administration's initiatives. Since OMB produced only a fraction of the documents addressed to Mr. Glauthier or authored by Mr. Glauthier that were included in the agencies' documents, please describe the search OMB performed in response to the House Government Reform Committee's June 26, 1998 subpoena to OMB for all responsive documents.

Answer. OMB undertook four separate searches in response to the four separate House Subcommittee requests on climate change.

The first request, dated March 6, 1998, contained 10 pages of document and information requests consisting of 68 numbered paragraphs. Many of the 68 numbered paragraphs contained multiple requests. Several meetings were held among OMB climate change staff to discuss the complex, voluminous request. Copies of the request were handed out to OMB staff responsible for programs related to the President's climate change initiative as well as other OMB staff, who searched OMB files for information responsive to the request. OMB responded to this request, producing documents to the Subcommittee on May 13, 1998.

The second request, contained in a subpoena from the Committee on Government Reform and Oversight, was received June 26, 1998. It contained 13 separate requests for climate change-related documents. Again, relevant OMB staff were contacted, there were oral discussions among staff, staff were given copies of the requests and asked to search their files for documents responsive to the request. These searches included searches for e-mails if retained by staff on the live system. OMB responded to this request producing documents to the Subcommittee on July 7, 1998. In producing documents, Mr. Glauthier did not include documents sent to him, only ones he originated or wrote on. However, in response to the third request, as indicated below, OMB staff searched Mr. Glauthier's files, including documents sent to Mr. Glauthier. Also, as indicated below in describing the fourth search, e-mails sent to Mr. Glauthier were electronically searched in response to that request.

The third request was received on July 20, 1998. This request included five separate requests for climate change-related documents. Again, relevant staff were contacted, copies of the request were handed out, and staff were asked to search for responsive documents. OMB responded to this request producing documents to the Subcommittee on July 24, 1998. Mr. Glauthier's files were searched by OMB staff and documents sent to Mr. Glauthier (and drafts) were included in the search and production of documents just as documents sent by Mr. Glauthier were included.

The fourth request was received on December 3, 1998. It was a single request for e-mails to or from Mr. Glauthier, and e-mails to or from another OMB employee. The fourth request was answered in part by conducting a computer search of backup electronic files of e-mails retained by the Executive Office of the President Office of Administration. This computer search included a search for e-mails sent to Mr.

Glauthier as well as ones sent by him (as well as those sent to or from the other OMB employees). OMB responded to this fourth request producing documents to the Subcommittee on January 4, 1999. Due to the technical difficulties in printing out the attachments to the e-mails, OMB responded separately on March 22, 1999, providing the print outs of attachments to the e-mails insofar as these could be retrieved.

The four searches resulted in the production to the Subcommittee of a total of approximately 5,600 pages of documents.

The four searches resulted in the production to the Subcommittee of 570 documents sent to or from T.J. Glauthier. 400 of those documents were ones sent to Mr. Glauthier.

Question 6b. Please provide for the record all memoranda or other written instructions to some or all OMB staff to ensure a complete search by all OMB officials and staff.

Answer. As indicated in the response to Question 6a, the process was handled orally with distribution of the written requests of the Subcommittee. There were no written directions, though e-mail directions may have been issued.

Question 6c. When will the missing responsive and subpoenaed T.J. Glauthier documents be submitted to Congress?

Answer. OMB is not aware of any missing responsive T.J. Glauthier documents. As noted above in the answer to Question 6a, OMB produced 570 responsive T.J. Glauthier documents to the Subcommittee. If the Subcommittee has questions or concerns about a particular document, we will do our best to respond to those concerns.

RESPONSES TO QUESTIONS FROM SENATOR GRAHAM

Question 1. Will you describe some of the international assistance programs for climate change that are administered by the U.S. Agency for International Development? What results have been achieved, so far?

Answer. In response to a Congressional request, USAID's climate change strategy was drafted in 1994 and later revised in 1997 to target twelve key countries and regions to implement a 'win-win' approach to climate-related intervention. The agency's climate change activities provide climate change benefits in addition to their primary objectives of increased energy efficiency, cleaner energy production, more effective natural resource management, and reduced urban pollution. By addressing climate change in conjunction with economic development and sector-specific goals, USAID leverages existing resources and assures a greater level of sustainability in these regions.

For example, many of our long-standing programs in Latin America promote conservation and sustainable use of protected, forested areas and buffer zones. These activities protect valuable carbon stores in addition to helping conserve biodiversity, promoting sustainable forest management, and reducing deforestation. (Key countries/regions are: Brazil, Central Africa, Central America, Central Asia, India, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, and Ukraine.)

USAID/Russia has introduced a comprehensive climate change program to preserve and expand Russia's globally important carbon sinks. This program builds upon their successful natural resources and biodiversity program implemented in the Russian Far East since 1993. In the forestry sector, programs focus on forest fire prevention, pest control, reforestation, and forestry policy. In the area of protected areas management, the primary focus is on protecting and expanding Russia's nature reserves through the introduction of innovative financing mechanisms, including environmental education and eco-tourism programs.

USAID's Asia Environmental Partnership (USAEP) program supports 11 Asian environmental NGOs to help Asian industries become more resource and energy efficient. For example, the NGO Pelangi Indonesia developed an environmental management system for hospitals and clinics in Jakarta that suggests ways to reduce waste, water, and energy use. In Thailand, the Association for Development of Environmental Quality is helping the Plan Group, a Thai leader in construction, to design guidelines for efficiency in the architecture and construction industries. The project addresses the use of sustainable construction materials, reducing waste from construction practices, and energy-efficient building designs. In 1997, USAID activities maintained or increased carbon stocks in over 25 million hectares in 19 countries/regions worldwide. During the same period, USAID supported programs and activities in developing countries resulting in over 2 million metric tons of carbon dioxide emissions avoided through energy efficiency, renewable energy, and clean energy projects.

Question 2. The Global Environment Facility was created in 1991, with more than 155 participating countries. The activities address biodiversity, international waters, sustainable energy, and the ozone layer. Why is this program included in the Administration's climate change budget?

Answer. U.S. contributions to the Global Environment Facility (GEF) are not formally part of the Administration's climate change budget. This multilateral organization has the lead internationally in helping developing countries take on responsibility for a range of global environmental problems. Launched in 1989 as awareness of these global issues grew, the GEF predates the 1992 Framework Convention on Climate Change and the 1997 Kyoto Protocol.

However, in the interest of completeness and transparency, the Administration included the GEF in an annex to the FY 2000 Report to Congress on Federal Climate Change Expenditures, since about 38.8% of GEF projects—those promoting clean fossil fuel technology, renewable energy, and energy efficiency—aim to reduce greenhouse gas emissions in developing countries. The Report to Congress includes a pro rata portion of U.S. annual contributions to the GEF as a climate-related expenditure, which corresponds to the percentage of clean energy projects in the GEF's overall portfolio.

RESPONSES TO QUESTIONS FROM SENATOR MURKOWSKI

Question 1. Describe the amount of U.S. funding that has been provided or promised to the nation of Argentina for the purpose of helping them devise their commitment to reduce emissions on a voluntary basis under the Kyoto Protocol, or for any other purpose related to Argentina's energy use or environmental activities.

Answer. EPA has obligated \$225,000 from FY 1998 and \$275,000 from FY 1999 funds to support technical studies on climate change and greenhouse gas emissions by the Argentine Department of Natural Resources and Sustainable Development. The funding for the Argentine Department of Natural Resources and Sustainable Development is being used for the following technical work program:

- to determine the present baseline for GHG emissions;
- to perform GHG inventory for 1997;
- to revise the 1990 and 1994 GHG emission inventories;
- to determine future emission projections;
- to establish different mitigation scenarios and analyze their impacts, and costs/benefits;
- to elaborate alternative proposals for GHG emissions goals under the Framework Convention; and
- to prepare a Second National Communication or a Revision of the Initial National Communication.

Question 2. Describe the level of broader financial assistance, including grants or loans provided to the nation of Argentina by the United States Government prior to and subsequent to Argentina's November 11 announcement of its intention to adopt a binding emissions target for the 2008-2012 time period.

Answer. United States Government financial assistance to the nation of Argentina prior to and subsequent to the announcement of its intention to adopt a binding emissions target for the purposes of supporting that effort is limited to the EPA funding discussed in Question 1.

Question 3. Describe the amount of U.S. funding that has been provided or promised to the nation of Kazakhstan for the purpose of helping them devise their commitment to reduce emissions on a voluntary basis under the Kyoto Protocol, or for any other purpose related to Kazakhstan's energy use or environmental activities.

Answer. USAID is the primary U.S. agency which has provided funding for environmental assistance to Kazakhstan. DOE provided minimal technical assistance in FY 1993. USAID's overarching strategy for environmental and energy activities in the Central Asian Republics focuses on regional security issues generated by conflicts over water and energy needs. Environmental and energy policy support have been important components of this development assistance, and climate-related activities have been a small but logical part of the overall energy and environment portfolios.

During the five years before Kazakhstan announced its commitment to take on a voluntary target at Buenos Aires in 1998, USAID provided a total of about \$15.3 million in combined energy and environmental assistance. In FY 1999, after Kazakhstan's stated commitment, USAID allocated a total of \$3.7 million for energy and environment activities.

In FY 1993, DOE awarded a \$400,000 grant to Kazakhstan through the Country Studies program. However, the program was not designed to assist countries in tak-

ing on emissions targets, but instead to assist countries in meeting obligations under the UN Framework Convention on Climate Change.

Question 4. Describe the level of broader financial assistance, including grants or loans, provided to the nation of Kazakhstan by the United States Government prior to and subsequent to Kazakhstan's November 12 announcement of its intention to adopt a binding emissions target for the 2008-2012 time period.

Answer. The following are the total obligations or planned allocations for the USAID/Kazakhstan mission from FY 1994-2000:

1994—\$137.7 million
 1995—\$47.2 million
 1996—\$33.5 million
 1997—\$35.5 million
 1998—\$40.5 million
 1999—\$44.2 million
 2000—\$53.5 million (proposed)

Question 5. Please describe the amount of funding that has been earmarked, obligated or spent for the purpose of conducting a pilot program to test Kyoto Protocol flexible mechanisms (emissions trading, joint implementation) with Russia or any other nation.

Answer. The Administration is exploring with the Russian Federation the possibility of a pilot project to evaluate the feasibility of greenhouse gas emissions trading involving the entirely voluntary participation of U.S. private firms. No funding has been earmarked, obligated or spent for this purpose. A letter describing the pilot project was sent to Representative Sensenbrenner earlier this month and a copy is attached to provide you more information.*

HOUSE OF REPRESENTATIVES,
 COMMITTEE ON GOVERNMENT REFORM,
 Washington, DC, July 12, 1999.

Hon. JACOB J. LEW,
 Director, Office of Management and Budget, Washington, DC.

DEAR DIRECTOR LEW: This letter comments on the Office of Management and Budget's (OMB's) July 2, 1999 response to the May 27 followup questions sent after the May 20 joint House/Senate hearing on "Global Climate Change: The Administration's Compliance with Recent Statutory Requirements."

OMB's answers are revealing in many ways. First, in response to Question 1b, OMB admits that performance measures for some of the Administration's new climate change programs "have yet to be developed." This is unacceptable if the Administration wants Congress to consider funding them in Fiscal Year (FY) 2000. Second, in response to Question 2a, OMB did not provide the total level of funding for all climate change programs and activities for each of the next four outyears, i.e., for FY 2001 through FY 2004. This is also unacceptable since Congress needs to understand the possible outyear cost associated with its FY 2000 budget decisions on climate change, especially because of the magnitude of the requested increase. Third, in response to Question 5b, OMB did not provide any criteria to ensure that OMB's regulatory review respects the statutory limitation in the 1999 VA-HUD Appropriations Act. This is unacceptable, especially for any regulations that have more than "incidental (or ancillary) effects" on greenhouse gas emissions.

Fourth, in response to Questions 6a and 6b, OMB astoundingly admits that it conducted its search in response to a Congressional subpoena by "oral discussions among staff" and "no written directions." Did OMB have oral discussions with each OMB staff member for each of the 44 line item budget accounts to conduct a thorough search of all climate change documents received, reviewed, or sent by them? If not, why not? In any case, are "oral discussions among staff" OMB's standard operating procedure for response to Congressional subpoenas? If not, please describe what is OMB's standard operating procedure.

Whether or not Congress should follow the Administration down a policy road that leads ultimately to the Kyoto Protocol and the regulation of America's energy economy is a very serious issue. The questions Senator Nickles and I submitted to you on May 27 deserve commensurately serious answers. The answers EPA has provided to questions 2a, 6c, 10b, 13a, and 13b are not acceptable. Please provide responsive answers to those questions. The responses should be delivered to the House Subcommittee staff in B-377 Rayburn House Office Building by no later than July 15, 1999. I will be sending you additional questions in a separate communication

*The letter has been retained in subcommittee files.

in response to other parts of EPA's June 23 letter. If you have any questions, please contact Staff Director Marlo Lewis at 225-1962.

Sincerely,

DAVID M. MCINTOSH,
*Chairman, Subcommittee on Na-
tional Economic Growth, Natural
Resources, and Regulatory Affairs.*

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