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Subgroup/Office of Origin: Office of Environmental Initiatives
Series/Staff Member: General Files
Subseries:

OA/ID Number: 19208
FolderID:

Folder Title:
Congressional Testimony on Climate Change 2/4/98 - 6/4/98 [1]

Stack:	Row:	Section:	Shelf:	Position:
S	62	1	4	2

Table of Contents

June 4, 1998	Committee on Energy and Natural Resources Dirk Forrister: Testimony Dan Reicher: Testimony John Karl Scholz: Testimony David M. Gardiner: Testimony
June 4, 1998	Congress Committee on Small Business Dr. Jannet Yellen: Testimony Raymond J. Keating: Testimony Terry F. Steinbecker: Testimony Harry C. Alford: Testimony Howard Geller: Testimony Marlo Lewis: Testimony
May 19, 1998	House Government Reform Subcommittee Dr. Janet Yellen: Oral and Written Statements
May 13, 1998	House International Relations Committee Dr. Janet Yellen: Oral and Written Statements Stuart E. Eizenstat: Oral and Written Statements
April 23, 1998	Government Reform Dan Reicher: Testimony Dr. Edward Montgomery: Testimony David Gardiner: Testimony
March 5, 1998	House Science Committee Stuart E. Eizenstat: Statement
March 5, 1998	Senate Agriculture Committee Richard Rominger: Oral and Written Statement Stuart E. Eizenstat: Statement Dr. Janet Yellen: Testimony
March 4, 1998	House Commerce Committee Dr. Janet Yellen: Oral and Written Stuart E. Eizenstat: Statement
February 11, 1998	Senate Foreign Relations Committee Stuart E. Eizenstat: Statement

February 4, 1998

House Science Committee
Kathleen A. McGinty: Statement

Statement of Chairman David McIntosh
Subcommittee on National Economic Growth,
Natural Resources, and Regulatory Affairs
on
“Kyoto Protocol: Is the Clinton-Gore Administration
Selling out Americans? -- Part IV”
June 24, 1998

Today's hearing is another in a series of hearings that the Subcommittee is conducting on the potential impact of the Kyoto Protocol on American citizens, American businesses and labor, the U.S. economy, and U.S. energy markets. At prior hearings, we heard from citizens, elected officials from state and local governments, and economic experts who believe that this treaty, which the Clinton-Gore Administration negotiated in December 1997, could potentially have very serious economic consequences for Americans.

The Kyoto Protocol commits the U.S. to reducing greenhouse gas emissions 7 percent below 1990 levels within the timeframe 2008 to 2012. To meet this target, experts project that we will have to decrease energy use by 40% or more.

Moreover, while the treaty imposes onerous requirements on the U.S. and other industrialized countries, it exempts developing nations from any new commitments, regardless of their economic development or the quantity of greenhouse gases they emit. Huge emissions producers like China, India, South Korea, Brazil, and Mexico are totally excluded.

At our hearing on May 19, 1998, Dr. Janet Yellen, President Clinton's principal White House economic adviser, told my Subcommittee that the costs to Americans of complying with the Kyoto Protocol would be "modest." According to the Administration's calculations, it would only cost one tenth of one percent of projected GDP in 2010, with an emissions price in the range of \$14 to \$23 per ton of carbon. Also, at the household level, the Administration estimates that each household's energy bill would increase only by \$70 to \$110 per year. Of course, she is assuming that the Clinton/Gore Administration will be able to convince other countries, including developing nations, to agree to an unrestricted, global emissions trading system that they now firmly oppose, and that the system will work as efficiently as the New York Stock Exchange.

By contrast, at our April 23, 1998 hearing, WEFA, Inc. economist Dr. Mary Novak testified that the Kyoto target for the U.S. could not be met without significant increases in energy prices. Dr. Novak predicted that the Protocol would result in a loss in GDP of 3.2 percent, or \$300 billion. In addition, the U.S. would lose 2.4 million jobs. Gasoline prices would rise 65 cents per gallon and industrial gas and electricity prices would double. This translates into an increase of about \$2,700 more annually per household for energy and other products.

This hearing will examine what all this will mean for the coal and electric utility industries and workers, if the Clinton/Gore Administration proceeds with the signing of this treaty.

According to Resources Data International (RDI), well over a third of current U.S. coal-fired generation may need to be eliminated to meet the Kyoto target. The utility sector accounts for about 37 percent of total U.S. CO₂ emissions, and coal-fired units account for 82 percent of electricity sector emissions. However, if coal-fired generation is drastically reduced, our nation will not be able to meet projected power demand in 2010. RDI estimates that there will be a 19 percent gap in available electricity generation, "even if wind and solar generation increase by almost 500 percent and natural gas increases by 170 percent from 1997 levels."

In addition, at this time, the only real substitute for coal is natural gas. But replacing more than half of our electricity output with natural gas raises significant questions about price increases and supply. The Department of Energy's Energy Information Administration recently estimated that, in 2010, the cost of natural gas will be about 2.6 times the cost of coal in 2010. Moreover, the present gas pipeline network is not adequate to meet such increased demand.

In short, a massive reduction of coal-fired generation and conversion to natural gas would put the reliability of our nation's electric supply at significant risk. Moreover, because our economic growth is tied to the availability of electricity, this would have a very adverse effect on the U.S. economy at large.

As you will hear today, both business and labor are in complete agreement that the Kyoto Protocol spells "All Pain and No Gain." Despite the enormous price that the U.S. would have to pay in complying, this treaty would accomplish almost nothing environmentally. Therefore, it would be nothing short of reckless for the Clinton/Gore Administration to proceed with the signing of this treaty. Signing this agreement would not only violate Senate Resolution 98, it also would make clear that President Clinton and Vice President Gore are putting their own political agenda ahead of the welfare and interests of the American people, our children, and future generations.

Finally, we have to make sure that the Administration does not jump the gun on Congress and implement the Kyoto Protocol through the back-door. While Under Secretary of State Eizenstat has repeatedly disavowed any intention of the Administration to implement the treaty without it first being ratified, these protests of innocence just don't square with the Administration's actions. Appropriations restrictions have now been proposed in both the House and Senate to put the brakes on such back-door actions. We have to pass these measures and say to Al Gore and Carol Browner, we have a United States Constitution, and we will not allow you to make an end-run around fundamental democratic processes to advance your radical social agenda.

STATEMENT OF SENATOR MICHAEL B. ENZI
House Subcommittee on National Economic Growth,
Natural Resources and Regulatory Affairs

June 24, 1998

Thank you, Mr. Chairman, for giving me the opportunity to testify this morning. I have been following your work on the issue of climate change and I appreciate your efforts and the efforts of this Subcommittee.

I am here this morning to tell you about the things I have been doing on the issue. I became involved with the climate change initiative last year when the Senate was debating the foreign operations appropriations bill. At the time, I wanted to know how much money the U.S. Government was spending to negotiate climate change issues. Clearly, we have been spending a lot of money to send bureaucrats around the world — to Berlin and Bonn, Montreal, Kyoto and New York — to work out a global warming treaty. The taxpayers are footing the bill for all this travel and I thought we should be able to find out where the tax dollars were going. I was also concerned that the State Department and other agencies involved, were pursuing this issue without any real legislative direction and without any accountability.

As I talked to people about the amendment, I ended up with more questions than answers. I decided we really needed to find out where all of the money on climate change was going — not just the administrative money. I also became more interested in the Treaty itself. I attended the Senate hearings on climate change and was an original cosponsor of the Byrd-Hagel resolution, which passed the Senate 95-0. Later, I went to

Kyoto as part of the Senate delegation where I had a chance to watch the negotiations firsthand. We met with various foreign delegations to explain the Senate "advice and consent" process and to express our concerns about the direction the Treaty was going.

The final agreement, as you know, does not meet the conditions of the Byrd-Hagel resolution. That leaves a lot of questions about the Administration's intentions on the issue, which is good reason for this Committee — and every other Committee responsible for spending other people's money — to monitor the Administration's proposals very closely. I believe there remain three big problems with the current approach to climate change:

1) Flawed treaty — whether or not you agree with the goal of the Kyoto Protocol, the negotiated treaty cannot achieve the goal. Furthermore, critically important parts of the Protocol — such as enforcement — are missing from the Agreement;

2) Lack of accountability — the Administration has been unable to reconcile its budget requests for climate change with the agencies' strategic plans. The goals of the climate change requests are unclear and the performance measurements — where they exist — are often not measurable; and

3) Cost — there is no accurate accounting of the costs for Americans who will have to meet the mandates necessitated by complying with the

Kyoto Protocol. In addition, until very recently, the Council of Economic Advisors has been unable to share its analysis with Congress.

The big picture is that the Administration is aggressively pursuing a policy where the values and risks are unclear. Furthermore, the proposed policies — where stated — will make negligible progress towards measurable goals. And finally, the American people are going to be stuck with a bill for an amount that is “to be determined.”

Mr. Chairman, it seems clear to me that on climate change, the Administration has put the cart well before the horse. They are steadfastly committed to a policy of reducing carbon dioxide emissions before they have any definitive science or cost estimates. Now they want Congress to fund the research that will supposedly justify their policies. They want the Council of Economic Advisors to support, through analysis, the cost estimates they are already using.

This is a backwards way to go about formulating policy. Shouldn't we evaluate the needs and costs before we push the policy?

THE KYOTO PROTOCOL IS FLAWED

I won't take much time to explain why the Treaty cannot work. As I said, even if you agree with the goal, it is obvious that this Treaty won't achieve that goal. With only 31 Annex I countries committed to reductions, we have left out the other 75 percent of the world. We have left out almost 90 percent of the world's population. The growth of carbon dioxide emissions in those countries will surpass emissions in the developed world within 10

years. Even the U.N. Intergovernmental Panel on Climate Change agrees that the Kyoto Protocol, as signed, will have a negligible effect on world carbon emissions.

A second important flaw to point out is that Kyoto's enforcement measures have yet to be defined. This is an issue I hear very little about, but one which I believe is critically important. Those provisions are still open to negotiation and once finished, will be amended into the Protocol by a 3/4 majority vote. Among the Protocol signatories, there are 132 developing countries, 15 European countries and 12 countries in transition — all of which would gain by imposing strong fines against the United States — and I am deeply concerned that the United States will be consistently outvoted by Protocol signatories.

LACK OF ACCOUNTABILITY

Mr. Chairman, I know that you have been working very hard to get budget numbers from the Administration on their climate change proposals. I too have been looking for those numbers. As I said before, my amendment to the Foreign Operations spending bill last year directed the Administration to describe all of its planned expenditures for domestic and international climate change activities for 1997, 1998 and thereafter.

What we hoped to get from the White House was a list of programs, by agency, with their expected costs and objectives. I thought the Office of Management and Budget would easily be able to locate the pots of money. I thought they could do it because it is the law. But it has been a much

more difficult process than I imagined it would be.

The President's response to the requirement in the Foreign Operations bill was a two-page letter describing the Climate Change Technology Initiative and the Global Change Research Program. No numbers were included in the Global Change Research Program section. No numbers were included showing how much money the Department of State has spent negotiating climate change or supporting the UN's scientific bodies. There were numerous cross-references that led to dead ends or conflicting information.

No numbers were included telling us how much "indirect programs" would cost — things like increased energy efficiency at the Department of Defense or improvements in General Services Administration buildings.

The Administration's letter is really an unacceptable response to our request. My colleague, Senator Hagel, has written to the Department of State with a great number of questions and concerns. The Department has not yet responded to that. I also know that Senator Domenici has been trying to obtain economic estimates for use in the Senate Budget Committee. I strongly support both of their efforts and the efforts of this Subcommittee, to get some real numbers from the Office of Management and Budget.

As the only accountant in the United States Senate, I like to see numbers that actually add up. If the Administration wants to spend \$6.3 billion of my constituents' money next year, then they should be able to show me what

they are spending it on. They should be able to show what they are trying to achieve. If they cannot do that — a task that is already required by the Government Performance and Results Act (GPRA) — then Congress should not agree to fund these initiatives.

As you know, there are really two cost estimates at issue. The first is our request to find out how much tax money the Administration wants to spend on climate change. The second issue is how much the Kyoto treaty will cost American workers and their families. Sadly, we have been unable to get either number from the White House.

HOW MUCH WILL KYOTO COST?

The Administration's accounting for expenditures grows even less reliable when asked to put a price tag on Kyoto. For over a year, the White House has downplayed the economic costs to Americans of any climate change treaty. They have assured us the impact will be small — that there are “cheap” ways to cut carbon emissions by 40 percent. Janet Yellen, Chairman of the Council of Economic Advisors, testified that the cost of Kyoto to American families would be modest — only \$90-110 per year. Meanwhile, other economists have suggested Kyoto will cost Americans as much as \$350 billion per year, based on Department of Energy estimates. That works out to almost \$1400 per person, per year.

That means 7500 lost jobs in the State of Wyoming. With only 200,000 people working in my state, that is a very big impact. The magnitude of difference in these estimates alone should be reason enough to delay any initiative, pending better analysis.

CONCLUSION

It is doubtful that the Administration will present the Kyoto Treaty to the Senate — not in its present form. But we in Congress must maintain a strict vigilance over future budget requests. I believe we must make sure that budget requests for all programs, fit into an agency's strategic plan. There must always be clear goals and measurable performance standards, in accordance with the GPRA.

I would strongly encourage members of this Committee to press agencies for explanations of budget requests that do not fit into their strategic plans. We should enact a government-wide legislative prohibition on implementation of the Kyoto Protocol. I am very concerned that agencies will experience "mission creep" into areas they have no interest or purpose being in. It is our jobs, as elected representatives and watchdogs of the U.S. Treasury, to make sure our constituents are getting something worthwhile in exchange for their tax dollars.

Until the Administration gives us a better picture of what they plan to do with all this money, I don't think our constituents are getting something worthwhile.

Thank you, Mr. Chairman. I will yield for questions.

**CITY OF HOMESTEAD, FLORIDA**

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STEVE SHIVER, *Mayor*JEFFREY D. PORTER, *Vice-Mayor*JOHN F. ASMAR, *City Manager***COUNCIL MEMBERS:**

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EDDIE BERDONES

ELIZA D. PERDY

NICHOLAS R. SINCORE

ROSCOE WARREN

Committee on Government Reform and Oversight**Mr. Chairman, Committee Members:**

Please accept my gratitude for the privilege of being here to speak with you on the tremendously grave issue of the economic impact of natural disasters. I am particularly grateful that this august group is addressing an issue which has changed the face of my community for all time. I believe that in many ways Homestead, Florida, represents Small Town America.

As an elected official, now serving my fifth term as Councilwoman and, as a citizen of this community, I want to share briefly with you the tremendous impact emotionally, physically and economically of Hurricane Andrew, and the simple fact that without the tremendous assistance from the Federal Government, I believe that my community would not have survived.

In August of 1992 Homestead underwent instant suburban renewal. We had 22 sq. miles of complete devastation; 30 billion dollars in total property damage; 17 billion dollars estimated insured losses; 300,000 people were evacuated; 300,000 jobs were lost; between 4,000 and 5,000 businesses were destroyed or damaged - many never to return. Thirty years worth of debris was created by this single storm.

Because of the devastation at Homestead Air Force Base we have lost 65,999 active military jobs, 21,115 civilian on-base jobs, 4,700 military related off base jobs, and some 43 million dollars annually in military related economic impact. The argument, of course, can be made that with national closing of bases, Homestead Air Force Base realignment was probably inevitable. However, when this occurs overnight there is no time for economic preparation.

- earth-based community
A second source of our economic strength is agriculture. Some 1 billion dollars in total damage to our tropical fruits, vegetable crops, foliage and nursery industry led to several years of decrease in production and obviously in jobs. Homestead enjoys a unique location -- nestled between two of our Nation's most beautiful parks and the natural splendor of the Florida Keys. Though the Keys blessedly escaped damage, both of our National parks, Biscayne and Everglades, were devastated and have just reopened within the last few years for ecotourism. Public schools, libraries, health facilities and our local hospital were all damaged severely, not only exacting a dollar cost, but loss of services was critical during this time.

Now let's talk a little bit about disaster response. Numbers tell the story of devastation, but the response numbers tell the story of hope. As of July of 1993, some 2 billion, 110 million dollars in government assistance had flowed into my community. The immediate response cost of military salaries and emergency supplies was some 207 million dollars. 107.6 million dollars in temporary housing vouchers were issued; the mobile homes and trailers which were brought in cost approximately 20 million dollars; 226 million dollars in SBA business loans and 389 million dollars in SBA home loans came into the community; 187.3 million dollars in individual and family grants and

25.8 million dollars in emergency food stamps were also issued; disaster employment assistance was 12.4 million dollars and crisis counseling and other costs bring the total to an astronomical sum. Federal dollars into the City from FEMA were 29.5 million dollars. An additional FEMA loan of 10.3 million dollars provided to the City to assist in the tremendous decrease in our ad valorem tax base and other revenue losses, such as our utility and water supply, was forgiven in 1997.

Even though our community continues to rebuild, with the courage that saw us through this disaster, because of demographic changes and other issues such as the closing of the Air Force Base, we project at least a ten year build out to return to the prosperity we once knew. Obviously, basic economic assistance for areas such as Homestead comes through the Federal and State governments in order to develop opportunities for private sector growth.

I do not have any claim to be a scientist, nor do I understand the complexity of global weather. However, I do speak with authority on the tremendous cost of natural disasters. It is my sincerest hope that with the sophisticated resources available to you, and with your obvious concern for the health, safety, and welfare of the people of the United States, decisions will be made to protect Homestead and of all the "Homesteads" across this great Nation.

I thank you for this opportunity and may God bless you all.

Eliza D. Perry
Councilwoman
City of Homestead, FL

6/24/98

Testimony of
Ernest J. Moniz
Under Secretary
U.S. Department of Energy
to the
Subcommittee on National Economic Growth,
Natural Resources, and Regulatory Affairs,
Committee on Government Reform and Oversight
June 24, 1998

Mr. Chairman and Members of the Committee:

Thank you for the opportunity to testify before your committee on the potential effects on the U.S. economy of meeting the Kyoto Protocol emissions targets and the implications for energy production.

The President's climate policy is directed at the twin goals of continued, vigorous economic growth and sustained quality of life for Americans. A robust technology development program and flexible market-based instruments will ensure the economic competitiveness that is the foundation of our economic vitality and will provide insurance against changes in our climate that may adversely affect our quality of life. Economic analysis suggests these goals can be achieved at modest cost with major attendant benefits. I will very briefly review the Administration's analysis to provide context and then focus on energy technology development, the responsibility of the Department of Energy in concert with the private sector, and a major focus of the first phase of the President's climate change program.

As the 21st century approaches, our nation faces many intertwined energy, economic, and environmental challenges. Over the next few years, we will: restructure U.S. electricity markets; implement new Federal and state clean air requirements; encounter a potentially volatile global energy market; face increased economic competition in the global market for clean energy technologies; and begin to confront the threat of global climate change. There are technology paths that can help meet all of these challenges and turn them into

opportunities. And DOE and its national laboratories are working diligently to make these a reality.

Research, development and accelerated use of energy efficiency and clean energy technologies, built upon a solid foundation of advanced science and basic research, are major parts of the solution. In fact, these technology paths are so important in meeting these challenges, that even without the concern for climate change, these investments have been and would continue to be wise national policy. This point was made last Fall by the President's Committee of Advisors on Science and Technology.

" . . . many of the energy-technology improvements that would be attractive for [greenhouse gas reduction] also could contribute importantly to addressing some of the other energy-related challenges that lie ahead, including reducing dependence on imported oil; diversifying the U.S. domestic fuel and electricity supply systems; expanding U.S. exports of energy-supply and energy-end-use technologies and know-how; reducing air and water pollution from fossil fuel technologies; reducing the cost and safety and security risks of nuclear energy systems around the world; fostering sustainable and stabilizing economic development; and strengthening U.S. leadership in science and technology."

These technologies coupled with the use of market-based mechanisms can lower the cost of meeting our climate objectives.

Flexibility and the Kyoto Protocol

Last December, in Kyoto, Japan, the Parties to the Framework Convention on Climate Change agreed to a set of flexible measures that will govern the climate change mitigation efforts of nations. These flexibility provisions are firmly based on a market perspective characteristic of the United States approach to addressing international environmental problems. These flexibility provisions will substantially lower the cost of reducing emissions, create international commercial opportunities for our businesses, and minimize the creation of international bureaucracy. They build on our own domestic experience with market-based instruments in the reduction of other emissions (e.g., sulfur dioxide).

The Kyoto Protocol incorporates flexibility in almost all its elements. The Protocol, for example, establishes the initial compliance period as 2008-2012. This multi-year target provides flexibility for investment decisions of U.S. companies and smooths out fluctuations in annual weather and business conditions.

Further, all six major greenhouse gases are included in the agreement allowing countries to seek the lowest cost emissions across the range of greenhouse gases. Emissions and removals of greenhouse gases from reforestation, afforestation and deforestation are

included as part of the agreement, as are procedures for adding additional categories of sinks in the future. The opportunities for reducing emissions are thereby greatly expanded and the costs of compliance greatly reduced.

The agreement also provides great flexibility in the mechanisms for reducing the cost of emissions reductions while ensuring environmental compliance. Foremost among those are international emissions trading and Joint Implementation among countries with targets. One of the Administration's goals is to have these rules in place well before 2008. Emissions trading and Joint Implementation will provide access to those cheaper reduction opportunities for U.S. industry. In addition to lowering costs, the expanded commercial opportunities for U.S. firms will likely spill over into other areas helping to generate jobs for Americans.

Lastly, the protocol defines a Clean Development Mechanism (CDM) that allows U.S. firms to invest in projects in developing countries, which result in new emissions reductions. Some of the most inexpensive reduction opportunities worldwide are available in these developing countries. Further, some of the largest markets of the next century for U.S. goods are also in these countries. The CDM unlocks the door to those low cost reductions and provides an additional bridge to those markets.

Benefits and Costs of Addressing Climate Change

The Kyoto Protocol is a first step in reducing our exposure to a potentially serious environmental threat with unparalleled global implications. Without a change in the pattern of greenhouse gas emissions, the Intergovernmental Panel on Climate Change (IPCC) warns that average global temperatures will increase from current levels between 2 and 6.5 degrees Fahrenheit by the end of the next century. This would translate into average July temperatures in Washington, D.C., of 5 to 15 degrees F above current levels with even greater humidity. By comparison, average global temperatures during the last ice age were only 9 degrees colder than today. The IPCC also forecasts a sea level rise of 6 to 37 inches by the end of the next century. A 20-inch sea level rise would result in substantial loss of coastal land on the Atlantic and Gulf coasts, which are particularly vulnerable.

There are, of course, remaining uncertainties in the science, specifically for regional projections. DOE's scientists, including those at our national laboratories, are working to refine our scientific and computational capabilities in order to address these uncertainties. Nevertheless, this uncertainty should not cause policy paralysis or inaction. On the contrary, it is time for prudent, cost-effective responses and for the development of the technologies that will generate economic growth while reducing our risk from climate change.

Dr. Janet Yellen, Chair of the President's Council of Economic Advisers (CEA), testified before this Subcommittee on March 4, 1998 concerning the least-cost ways of reducing this exposure. Her testimony highlighted the substantial cost reductions that are associated with three of the flexibility mechanisms in the Protocol: International emissions trading, Joint Implementation by Annex I countries, and the Clean Development Mechanism.

While I am not an economist, allow me to repeat her main conclusions for context. She concluded that the costs would be modest for reaching the Kyoto objectives. Dr. Yellen traced potential cost reductions to three features of the flexibility mechanisms:

- (1) "when" flexibility provided by five year targets and banking opportunities;
- (2) "what" flexibility that allows countries to meet targets with a combination of reductions from six gases and sinks; and (3) "where" flexibility that allows emissions reductions to occur where they are the least expensive.

Dr. Yellen indicated that analysis suggests that with a successful worldwide trading regime for greenhouse gas emissions, the cost of emissions permits would be \$14-\$23 per ton of carbon equivalent. Total resource costs -- the cost of permits purchased abroad plus domestic reductions of greenhouse gases -- would be \$7 to \$12 billion per year, or 0.1 percent of projected GDP, during the first budget period of 2008 to 2012. The CEA does not foresee any significant aggregate employment effect under the conditions described in the analysis. Analyses that do not include international emissions trading, Joint Implementation and the Clean Development Mechanism suggest higher costs, reaffirming the importance of those flexible market-based instruments.

Dr. Yellen also noted the CEA analysis did not include estimates of the:

- cost savings from the Administration's electric restructuring plan (estimated at \$20 billion per year) and the associated emissions reductions (estimated at 25-40 million tons of carbon equivalent per year);
- cost savings from land use changes that would increase carbon sequestration by forests and agriculture;
- benefits of avoiding the effects of climate change;
- benefits (e.g., health improvements) of reducing other pollutants such as sulfur dioxide and particulate matter; and
- significant technological improvement and penetration of these technologies into the domestic and global market place.

The Role of Technology

Technology R&D will not only enable us to meet the energy and environmental objectives of the next century, but also is a key driver of long-term economic development. The ability to develop and deploy new technologies in a wide range of

fields has been a key reason for the remarkable success of the U.S. economy in the last fifty years and will continue to drive our economic development over the next fifty years. Sustained commitment to R&D in both private industry and the federal government has produced these results. However, corporate downsizing, increased competition, financial pressures and other factors have drastically cut the level of private investment in R&D in many industries -- especially in energy. Without a substantial federal effort --in collaboration with industry -- many advanced technologies will likely not be developed and our nation will suffer the resulting economic losses.

A broad and balanced R&D portfolio -- one that builds on clean fossil, renewable and nuclear supplies and increased efficiency of energy use -- is essential. A robust energy portfolio will provide many additional benefits, including reduced energy costs, increased energy security, improved air quality, greater U.S. competitiveness, and reduced greenhouse gas emissions. The study of technology pathways carried out by eleven DOE national laboratories concluded that greenhouse gas emission reductions in the 150-200 million metric tons range of carbon equivalent are realizable by 2010 from technology development; much larger reductions would follow in the ensuing decades. Examples of promising technologies are:

- A fish friendly turbine that will help us preserve our large installed hydropower base that currently provides approximately 10 percent of U.S. electricity;
- Technologies that improve the efficiency and extend the operating life of current nuclear power plants that currently provide 20 percent of U.S. electricity;
- Super clean diesel engines that will be one-third more efficient than comparable gasoline engines and meet equivalent emission standards;
- Advanced gas turbines that can provide industrial and commercial buildings not only with their electricity, but with their heat, at system efficiencies of 70 percent and higher;
- R&D partnerships with the most energy-intensive U.S. industries -- like steel, chemicals, and forest products -- to develop technologies that save energy and increase industrial productivity;
- A new R&D collaboration with the agriculture industry to use crops like corn and soybeans -- instead of oil -- to make everyday consumer items, ranging from paints and plastics to carpets and car parts; and,
- Sequestration technologies to keep the carbon dioxide from coal combustion out of the atmosphere.

These technologies present opportunities to meet our economic, energy security and climate change goals simultaneously. Let me now turn to a more detailed look at key technology areas and sectors.

Efficient Use of Conventional Energy Options:

About 93 percent of the energy we consume today comes from fossil and nuclear fuel. Energy efficiency is not some "green" alternative to the "real business" of traditional energy investments; rather, it is grounded in better use of our dominant energy resources. The Department has a long-standing interest and investment program in energy-efficiency R&D. Advances in energy efficiency technologies offer the greatest near-term opportunity for securing environmental, economic and energy security goals. Important examples of the technologies we are working on in this area include: cogeneration, intelligent building control systems (that could increase new building efficiency by 50 percent), fuel cells joined with combined cycle plants, integrated gasification combined cycle power plants (potentially boosting power plant efficiencies to 65 percent), and transportation technologies through the Partnership for a New Generation of Vehicles (that will result in triple efficiency automobiles). I will amplify on these by sector.

Electric Utilities:

The range of carbon values identified by Dr. Yellen would be unlikely to affect electric utilities significantly. As is noted in the coal industry discussion below, new plant fuel choice and decisions regarding the dispatch of existing plants are likely to remain largely unaffected. Moreover, electric utilities do not compete to a significant extent with offshore suppliers. If carbon values were passed through into the prices of fuel burned at electric utilities, the cost of electricity would be increased relative to a "no commitments" forecast. However, even with full pass through, DOE expects the cost of electricity to remain below today's prices in real terms during the first commitment period. Furthermore, adoption of the Administration's Comprehensive Electricity Competition Plan, is expected to provide additional savings and cost reduction that would exceed the value of a full pass through of carbon values into fuel costs. That saving has been estimated to be in the neighborhood of \$20 billion per year. In addition, greenhouse gas emissions will be reduced by 25-40 million metric tons of carbon equivalent as the industry becomes more energy efficient.

Coal:

not out to zero out coal. admin has recently focused on coal tech.

The range of carbon values identified in Dr. Yellen's testimony would be unlikely to affect projections of future coal use significantly through 2008-2012. Natural gas is already the fuel of choice for new capacity additions, and most forecasts suggest that it is likely to remain so for the foreseeable future whether or not emissions values feed through into energy prices. With respect to the dispatch of existing steam and

combustion turbine plants, the order of economic dispatch would not appear to be significantly affected by estimated carbon values. Taken together, these two factors suggest modest impacts on coal use and mining during the 2008-2012 period.

Technology development and market penetration can particularly benefit coal-fired generation as the cleaner technologies under development will increase the efficiency with which coal is used, enhancing its cost competitive nature while minimizing carbon intensity. Advanced electric generation technologies are helping us lower greenhouse gas emissions from power plants. Recently, I visited Sierra Pacific's Piñon Pines project. Built under a 50/50 cost-sharing arrangement, DOE's Clean Coal Technology Program and Sierra Pacific Power Company dedicated the 100 megawatt integrated gasification combined cycle power plant outside Reno, Nevada. This plant will be 10 percentage points more efficient than a conventional coal-burning power plant and, as a result, will emit correspondingly fewer greenhouse gases. To provide a scale, we note that if all coal-fired power plants could achieve this rate of efficiency improvement, emissions would be reduced almost 100 million metric tons of carbon each year. The Piñon Pines project achieves this result while virtually eliminating sulfur dioxide and nitrogen oxides emissions.

uniquely targeted @ climate
Carbon sequestration is the removal of atmospheric carbon through natural or induced methods and is another technology option for coal (and indeed, for all fossil fuels) and is part of the President's Climate Change Technology Initiative. Research and development on this technology is at its early stages and large scale impacts are not anticipated for decades. Given that the vast wealth of U.S. coal resources surpasses the entire energy content of all of the world's known, producible oil, technology breakthroughs in sequestration could prove to be a major benefit for the domestic coal industry, for the creation of international markets, and for minimizing coal impacts on the environment. Capture of combustion gases, production of hydrogen from natural gas, use of micro algae to convert power plant CO₂ to biomass, injection of CO₂ in terrestrial aquifers (already being done to enhance oil and gas production), and oceanic injection of CO₂ are all examples of potential opportunities for enhanced sequestration as are modifications to agricultural and forestry practices. DOE has recently selected an initial group of twelve research projects to pursue the inexpensive capture and permanent disposal of greenhouse gases covering many of these opportunities.

Oil:

Impacts on domestic oil production would probably be modest. One thing we know for sure is that technology is helping us lower the cost of drilling and increase our energy resources. Research in the Alpine fields area of Alaska demonstrates that state of the art drilling and production methods can significantly reduce the environmental impact of oil and gas production. Earlier this year I had the opportunity to visit this site and came away very impressed by the small environmental footprint of this development project.

The Department is developing technologies that will decrease our oil consumption through innovation. The Partnership for a New Generation of Vehicles (PNGV) -- a collaboration between the Federal government and the U.S. automobile industry -- is developing a production prototype car with a fuel efficiency of up to three times today's vehicles, or 80 miles per gallon by 2004, with no compromise in size, safety, affordability or performance. In January, Chrysler, Ford, and GM made news with their announcement of PNGV concept vehicles that promise two to three times greater fuel efficiency than available today. If these vehicles replaced only five percent of the current auto fleet, oil consumption would drop by almost one-quarter million barrels per day and carbon emissions would fall by about ten million metric tons.

In oil refining, advanced technologies are improving the quality of heavier crude oils. Research in ceramic membranes will provide improvements that can be used to increase the hydrogen content and improve product quality. Likewise, biochemical process research innovations can be used to improve the quality of heavier domestic oils such as those that are produced in California.

Natural Gas:

In contrast to oil, nearly all U.S. consumption of natural gas is supplied by North American sources. Many analysts believe that meeting the emissions targets for the United States would result in increased use, and domestic production, of natural gas.

A large potential exists for using natural gas more efficiently. Advanced gas turbines for industrial applications -- developed by the Department in partnership with private industry -- are nearly 50 percent more efficient than conventional small turbines. This technology can provide industrial and commercial buildings not only with inexpensive electricity, but with their heat, at total system energy efficiencies of 85 percent and with extremely low NOX emissions. This compares to efficiencies of around 40 percent today. Fuel cells are another extraordinarily promising technology that produces power and thermal energy electrochemically at very high efficiencies with virtually zero emissions. This exciting technology has enormous potential from power plants to our homes and offices to automotive propulsion systems. Just last week, Secretary Peña announced the first installation of a fuel cell in a home, by a company called Plug Power, where this fuel cell will produce electricity and allow the home to be removed from the electricity grid.

Last year, DOE awarded a cost-shared R&D contract to produce a revolutionary ceramic membrane for converting natural gas into a middle distillate liquid. If this research provides a substantially lower cost alternative to cryogenic oxygen separation, it would represent a major breakthrough for transporting natural gas. Alaska alone could then add a billion barrels or more of vital liquids to our energy supply.

Research on methane production from hydrates can contribute low cost natural gas to satisfy domestic demand. As much as 200,000 trillion cubic feet of methane may exist in hydrate systems in the U.S. permafrost regions and surrounding waters, which is over a hundred times greater than the estimated conventional U.S. gas resource base of 1,400 trillion cubic feet. The Department is engaged in ongoing research to determine the commercial viability of this resource.

We estimate that our natural gas technologies and policies will stimulate growth of low carbon natural gas production by as much as six trillion cubic feet by the year 2010 to fuel increased demand in electric generation.

Nuclear:

Nuclear power plants generate electricity without producing carbon dioxide, sulfur oxide, or nitrogen oxide emissions. This represents about 100 million metric tons of carbon emissions avoided annually. Consequently, the Department's FY 1999 budget proposal includes two modest initiatives aimed at sustaining nuclear energy as a viable option. First, the Nuclear Energy Plant Optimization program is the Department's response to the PCAST recommendation that the Department initiate a program of research aimed at operating nuclear power plants. The proposed program would develop the technologies needed to improve capacity factors of existing U.S. plants and to extend their useful lives. Second, the Nuclear Energy Research Initiative is a program that features an independent, competitive, peer-reviewed process for selecting from among investigator-initiated R&D proposals. This program will fund work in areas such as advanced nuclear fuel, proliferation-resistant reactor systems, and least-cost, advanced power systems.

Renewables:

Renewable energy technologies have substantial potential to produce low-cost electricity with virtually zero emissions using plentiful U.S. energy resources. Steady R&D progress over the last 15 years has brought the costs of solar photovoltaics, wind, geothermal, biomass and other technologies down by factors of 5 to 10. These technologies are already finding their way into selected markets and are poised to increase their market share. For example, wind power now costs less than 5 cents per kilowatt-hour in favorable wind sites and is the focus of increased attention in many electric utilities. These technologies provide power with minimal environmental impacts, have low or zero greenhouse gas emissions and will allow American industry to be very competitive in the trillion dollar global market for clean energy technologies over the next several decades.

According to the recently completed study conducted by eleven of our laboratories, biomass, wind, solar, and geothermal technologies may reduce U.S. carbon emissions in the range of 100 million metric tons by 2030.

Recently, Mayor Giuliani and Secretary Peña celebrated a new state of the art office tower in Manhattan -- a building already fully rented, powered in part by fuel cells and photovoltaic panels, and expected to be 40 percent more energy efficient than the average building its size, with a similar reduction in associated greenhouse gas emissions. DOE developed the technologies used in this building in partnership with industry and the national laboratories. This points out that the technologies we are discussing are real alternatives that can be expected to be used more widely over the next decades.

Conclusion

These are just some examples of the role DOE can play. Clearly, the common ground in the climate change debate is technology. From Mobil Oil to the Sierra Club, there is agreement that substantial industry and government support for energy R&D is a key element of an effective and prudent response to climate change, independent of opinions about the science or diplomacy of the issue. Last year, 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 could be achieved without increasing the nation's total energy bill. More recently, eleven national laboratory directors issued a study that outlined almost 50 separate technology pathways for reducing greenhouse gas emissions over the next 30 years while providing other energy, environmental, and economic benefits. We hope to work with the Congress in a bipartisan spirit to advance the nation's basic and applied research programs.

A strengthened energy science and technology program, together with synergistic tax incentives for accelerated technology introduction, is an important first step with multiple benefits for America. A *Washington Post* editorial on the Administration's FY 1999 budget-proposal put it this way:

"...this [global warming] proposal would make sense whether Kyoto ever comes into force or not. Most of the initiatives would spur industry toward pollution-reducing measures that will benefit the country and make industry more competitive in the long run. Indeed, those who oppose binding commitments, trading permits, increased fuel taxes and more regulation should, more than anyone else, embrace measures that might produce progress without coercion."

Finally, 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. Over the next four decades, developing countries alone will require new electricity generating capacity worth more than \$3 trillion. In order to meet this energy demand and reap the resulting technology sales and jobs, we must invest now in the research, development, and demonstration 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, then the U.S. economy, our citizens, and the global environment will be the real losers.

Thank you and I will be pleased to answer your questions.

**INTERNATIONAL BROTHERHOOD OF BOILERMAKERS, IRON SHIP
BUILDERS, BLACKSMITHS, FORGERS AND HELPERS, AFL-CIO**

June 24, 1998

Committee on Governmental Reform and Oversight;
Subcommittee on National Economic Growth,
Natural Resources and Regulator Affairs

Presented by: Ande Abbott
Assistant to the International President

Thank you Mr. Chairman for permitting me to testify before your committee on behalf of our membership regarding the Kyoto Climate Change Protocol and the impacts the protocol would have on our members.

The International Brotherhood of Boilermakers represents approximately 90,000 members in many diverse industries throughout the United States. But we represent more than just boiler makers. We have seven divisions--Shipbuilding and Marine Repair; Tank Building; Cement, Lime, Gypsum and Allied Workers; Railroad; Industrial Plants and Shops; and Stove, Furnace, Energy and Allied Appliance Workers. We represent workers in the private and U.S. navy shipyards, power plants, paper mills, oil refineries, copper smelters, cement and construction materials plants, quarries and mines, forging and heating treating plants and appliance manufacturing just to name a few. Most of the workers we represent are employed in industries that consume enormous amounts of fuel.

Mr. Chairman, the membership of the International Brotherhood of Boilermakers strongly supported the Clean Air Act of 1970 and worked hard for the amendments in 1990. With the development and design of clean air technology in the 1970's and 1980's there was no excuse to continue to emit bellowing black or brown smoke and soot into our communities and country sides. Fortunately, the Clean Air Act

has caused positive changes to the character of many cities and to the health of many citizens.

While working to enact the Clean Air Act, there were known adverse affects and known solutions and technologies. The members of the International Brotherhood of Boilermakers benefited in several ways from the Clean Air Act; they received good wages to construct and maintain the clean air equipment and they could go home to their families after work and breath clean air.

Did the Clean Air Act have a down side? Yes it did. There were many of our local lodges that closed because their places of employment went out of business, especially in the Great Lakes area. Some of those businesses moved to Mexico or to Asia in order to escape the cost of installing clean air equipment. As a result, our workers suffered long term unemployment and many of those workers, currently, do not hold jobs that pay the wages and benefits of their former jobs.

When these factories were built in foreign countries, they were not required to install clean air equipment. Now, the same "multinational companies" that were formally operating in the U.S. are now importing the same products that they previously made--without any obligation to control emissions.

Regulators must be conscious when actions are taken to change environmental standards in the Unites States that jobs are not driven out of this country and to other countries, which are also our competitors. Our competitors will produce the same products while emitting air pollution--more pollution than if the product were made in the United States.

On December 1-12, 1997, in Kyoto, Japan, the third meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change was held--often referred to as the "Kyoto Protocol." The Kyoto Protocol committed the United States to specific legally binding emissions reductions, targeting six gases thought to cause a greenhouse effect on the earth. The six gases are: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorinated compounds, and sulfur hexafluoride. Of these gases, the one that must be reduced the most is carbon dioxide.

The Kyoto Protocol requires the United States to reduce greenhouse gas emissions by 7% from the 1990 levels, on average, within the period of 2008 and 2012. (The details on how that will take place will occur in November of this year at the 4th meeting of the Convention of the Parties). With future population and economic growth, this would equate to roughly a 35% reduction from our baseline emissions of greenhouse gases such as, carbon dioxide and methane.

During the summit in Kyoto, the developing nations adamantly refused to accept any new commitments for greenhouse gas emission controls. At the same time, the U.S. negotiators agreed to new emission controls--despite President Clinton's pledge on October 22, 1997 that "the United States will not assume binding obligations unless key developing nations meaningfully participate in this effort." In addition, the protocol fails to meet the test for acceptance of new greenhouse gas commitments established by U.S. Senate Resolution No. 98, passed unanimously in July 1997. S. Res. No. 98 requires that "the protocol or other agreement...mandate specific scheduled commitments within the same compliance period...for Developing Country Parties."

Under the United Nations Global Climate Treaty, 127 developing nations--including Mexico, South Korea, India, Brazil and China--will be exempted from any serious commitments to reduce greenhouse gas emissions while developed nations such as the United States will be painfully forced to reduce emissions. This is not only unfair, it defeats the whole purpose of a global climate agreement.

If nations such as Mexico, China and India get a free ride at our expense, American companies, jobs and economic activity would be transferred from this country to exempted countries. It has been estimated that over 1.5 million American jobs will be lost. The presumed global environmental benefits of the sacrifices by American companies and workers would not be realized because reduced emissions in the United States would be offset by increased emissions from the exempted developing nations.

The fact that Mexico would be excluded poses a very serious threat to the United States. For example, recent forest fires in Mexico and Central America resulted in a very serious smoky haze covering large areas of South America and the U.S., specifically the southern border region. Visibility was poor and breathing was difficult for everyone. The fires were eventually extinguished, but it proves that the prevailing winds into the United States from other countries can carry industrial emissions. Industrial emissions don't respect borders.

We can predict some of the actions that will occur as a result of the proposed reduction in carbon dioxide levels. It will require the closing of some power plants, switching of fuels in other cases and the rationing of gasoline and other consumer fuels. Homes that now rely on oil for heat will have to switch to more expensive fuels and likely change the heating equipment they now have installed. Gasoline powered lawn mowers may be outlawed, barbecue grills could be

banned in many areas. Automobiles may be restricted in a very serious manner. In addition, the cost of Natural gas and gasoline will increase significantly, inflation will be spurred and interest rates will be increased to control them.

This organization has a serious problem with the "shotgun" approach proposed by the environmental community in regards to the climate change proposals. The environmental community began talking of the existence of chlorofluorocarbons, CFC's, in the upper atmosphere, claiming that it caused a hole in the ozone layer and contributed to the greenhouse effect. Soon after, the United States and many other countries banned chlorofluorocarbons. While there seemed to be evidence of damage by CFC's, there was an acceptable solution and action was taken to ban CFC's.

Next, lists of gas compounds began to appear and the claim by environmentalist was that each may cause an adverse effect in the atmosphere and that carbon dioxide and methane may cause a greenhouse effect. Unlike the chlorofluorocarbons, both methane and carbon dioxide occur naturally in nature.

U.S. business has gradually implemented clean air quality techniques over the last 30 years. Capital investments in clean air equipment to reduce air borne contamination and nitrous oxide has cost American industry billions of dollars. Adopting the Kyoto protocol at this point, before the Clean Air Act has been fully implemented is foolish and unnecessary.

One proposal to be discussed at the November Meeting of the Parties, is the matter of who will pay for mitigation measurers in developing countries. Developing countries argue that developed countries should pay for incremental costs for mitigation. The

Boilermakers firmly believe that the United States should not pay the costs of other countries compliance actions and that U.S. taxpayers should not be the victims of companies moving off shore--in order for them to escape clean air regulations--and then be victimized again by having to pay for the mitigation in a foreign country.

JOBS WILL BE LOST

The Protocol will require the United States to reduce carbon dioxide production to 7% less than the 1990 level. This proposal is not the only regulatory implementation taking place over the next 10 to 15 years--the ill-considered EPA ozone and particulate regulations are being implemented and electrical energy deregulation will also occur within the same time frame. The overall effect will be devastating to U.S. workers and to the companies that employs them.

In 1992 the Department of Commerce released a study stating that a carbon tax would help the U.S. achieve emission reductions, of the scale now being discussed in the U.N., would cost some 1.7 million U.S. industrial jobs.

Reducing our emissions of greenhouse gases by 7% can only be accomplished by new taxes on gasoline, coal, and natural gas, and by rationing fuels through a new "allowance" program for carbon emissions. By increasing the incentives for American industries to locate offshore to low-wage developing nations, exempt from greenhouse gas limitations, the Kyoto Protocol is all pain and no gain for American workers.

Within the microcosm of our union, the cement industry alone, would lose a minimum of 3000 jobs. Our coal mines will likely shut down at a loss of 1800 jobs. In addition, the Boilermakers projected

that that our construction division will be reduced by approximately 12,000 members, in the foundry and forge industry we project that we will lose approximately 4000 jobs, in the metal fabrication shops we project that we will lose approximately 9000 jobs and from our manufacturing sector we project that we will lose approximately 3500 jobs. Approximately 33,300 jobs are expected to be lost in total. Roughly a third of our existing membership. Generally, there is a multiplier effect of approximately 2.5 to 1 on the surrounding community--adding more job loss to the equation.

Predictions from the Economic Policy Institute calculate that national employment growth will decrease by up to 2.6 million jobs by 2006. In the long run, approximately 500,000 high paying jobs in mining, transportation, public utilities and up to 340,000 manufacturing jobs would be eliminated in 2020. EPI also predicts that the trade deficit will widen by \$240 billion.

Electrical power generation, which today uses coal and fossil fuel, provides the cheapest energy. If fuel switching is required as a result of the Kyoto Protocol, the price of energy will increase. One of the reasons that U.S. manufacturers can be competitive is because we have cheap, reliable energy. Switching to natural gas or nuclear power will only increase costs to manufacturers and could result in more jobs losses.

Fuel switching can be expensive and alternate fuels are more expensive than coal or fossil fuel. The fuel shortages and higher fuel costs, while President Carter was in office, caused inflation to jump. It also caused high unemployment and high consumer interest rates throughout the country--resulting in even more job losses.

EPI calculates an increase of 33% rise in gasoline prices by 2010 and a 43% increase by 2020. Natural gas prices will jump by 129% in 2010 and 157% by 2020. Coal prices will rise 482% in 2010 and a staggering 761% by 2020. Because of the rise in the costs of fuel, electricity prices will increase between 66% and 94% in 2020. The rising cost of energy will reduce average family household disposable income by \$2,350 annually by 2010.

INDEPENDENT RESEARCH NEEDED

There needs to be more independent research to find out if global warming is a natural phenomenon of planet earth. For example, Vice President Al Gore spoke on the melting of the glaciers as evidence of global warming. Mr. Chairman, I did some research which told me the last ice age ended about 10,000 years ago. The earth has gradually gotten warmer since. My research also indicates that geologists can identify at least seven ice ages that our planet has undergone over the past 250 million years. Each time the glaciers have melted almost completely. I don't claim to be an expert in this area, but the ice ages came and went, and the earth warmed each time long before man began driving cars and building power plants that emitted carbon dioxide.

If research can show that carbon dioxide indeed causes global warming then how much of that warming is caused by carbon dioxide as a result of nature and how much is man creating? The earth produces carbon dioxide and methane on its own--are we going to try and keep nature from producing methane, carbon dioxide, and other gases that occur naturally in nature? If we reverse global warming do we cause another ice age?

A report in the Washington Post, a couple of weeks ago, claimed that the earth is being bombarded with over a million pounds of space dust each year and that dust is causing a greenhouse effect. There are also claims that deforestation causes greenhouse gases to form. Some environmental groups and United Nations policy makers have cited estimates of the earth's future climate, which were based on questionable computer models. The U.S. General Accounting Office reports that current climate models are useful as research tools, but are too inaccurate to provide reliable policy guidance.

In addition, some environmentalists believe that carbon dioxide might change the global climate. They point to information that says over the last one hundred years the air temperature of the globe has increased an average of .9 degrees Fahrenheit. And without some adjustment, there could be a change of 3 to 8 degrees Fahrenheit over the next one hundred years. An increase of .9 degrees Fahrenheit could easily be explained by miscalibration of equipment used 100 years ago. In addition, they do not know if the temperature rise is attributable to human activity or natural variations.

Before we try to change the forces of nature we should be doubly sure that we know what we are doing. Actions required by the protocol will cause a lot of harm to U.S. industry and workers. There needs to be more questioning and more studies by sources outside of the environmental community to come up with conclusions instead of guesses that carbon dioxide might cause global warming. There needs to be a common sense approach to deal with this issue.

BACKDOOR ENFORCEMENT

As you know, the Kyoto agreement will not become legally binding on the United States unless it is ratified by the U.S. Senate.

Senate ratification of the protocol in its current form is very unlikely due to its exclusion of developing nations. The Clinton Administration has pledged to obtain commitments from developing nations in time for the next international climate conference in Buenos Aires, Argentina in November 1998. The willingness of China and other growing economies to participate in a truly global effort to reduce greenhouse gases will be a test of the Kyoto Protocol's political viability in the U.S.

Even if the Kyoto Protocol is rejected by the Senate, the Clinton Administration has promised that the United States will meet its targeted reduction of greenhouse gases. The U.S. EPA is already vigorously implementing the new air quality standards for ozone and particulate matter and are encouraging electric utilities to switch from coal to natural gas. New EPA programs for regional haze and toxic air pollutants are also being developed to reduce the use of coal. And, the Administration is expected to propose utility restructuring requirements calling for massive reductions of greenhouse gas emissions.

These backdoor efforts to achieve greenhouse gas emission reductions through regulatory initiatives impose an extremely unfair burden on workers and their families. Instead of spreading the pain of emission reduction requirements across all industries, the Administration is targeting coal-fired electric generation for stringent new environmental controls. All Americans will feel the shock of steeper electric rates, of job losses, declining tax bases to support community services and higher energy costs. And, American manufacturers will be hit with higher energy costs which will damage their competitiveness in the world market.

CONCLUSION

The upcoming U.N. climate treaty is **All Pain and No Gain** for American workers and consumers. American workers are being asked to sacrifice to solve a problem that everyone agrees is an international problem. If our goal really is to reduce global warming, then the whole world needs to share in that responsibility--and that means every country, no matter how large or small. The truth is that no matter how many restrictions the developed nations must adhere to, an unregulated China could, by itself, destroy the global environment.

Developing nations emit nearly half of global greenhouse gases. Emissions from these countries will surpass those of the U.S. and other advanced economies by the year 2010. The failure to include limits on developing nation emissions means that the Kyoto Protocol will not materially change global atmospheric concentrations of greenhouse gases. At most, the protocol would delay the projected doubling of atmospheric concentrations of carbon dioxide from pre-industrial levels by 7 or 8 years, from the year 2059 to the year 2066.

Like people all over the world, the Boilermakers want clean air for themselves and their families--we're just tired of always being the ones who pay the price. The Boilermakers are not opposed to reasonable steps that will reduce greenhouse gases, but we cannot support policies that unfairly harm American workers and businesses while allowing less developed nations to avoid any responsibility for solving this global problem.

Mr. Chairman when we look at the economic consequences of the implementation and the actions needed to mitigate methane and carbon dioxide production, we must be sure that such actions are necessary and that such actions have a desired effect. We must take a

common sense approach, one that is respectful of the citizens who are the governed and the companies that must be competitive. Rushing to reduce greenhouse gases in the United States will have a severe impact on consumers, workers and businesses.

For the United States to take the biggest cut of all the industrial nations, it is wrong. It is also wrong for the developing nations of the world not to share the burden. After all, the corporations that are moving plants to China, Indonesia and India are companies that are escaping air quality standards in the United States or Europe.

If the developing countries are not going to regulate and enforce obtainable clean air quality standards, then the companies that move into those countries should be penalized when their products are imported back into the U.S. Otherwise the United States will lose our manufacturing base.

An analysis by the Edison Electric Research Institute clearly shows that nothing we do in the next 15 to 20 years will have an impact on environmental conditions of 2050. Plenty of time exists to acquire more knowledge and more accurate scientific data, the potential impact on citizens of our country and to develop technology that will lower mitigation costs.

The proposed actions will produce little, if any, benefit at a huge cost to our nation, our citizens and our businesses. The International Brotherhood of Boilermakers strongly opposes the adoption of the Kyoto Protocol and implementation of any rule or regulation that is drafted to achieve the goals of that protocol.

TESTIMONY OF PAUL A. AGATHEN
SR. VICE PRESIDENT FOR ENERGY SUPPLY SERVICES
AMEREN CORPORATION
BEFORE THE HOUSE GOVERNMENT REFORM AND OVERSIGHT COMMITTEE
SUBCOMMITTEE ON NATIONAL ECONOMIC GROWTH, NATURAL RESOURCES, AND
REGULATORY AFFAIRS
JUNE 24, 1998

Good morning, Mr. Chairman and members of the committee. Thank you for the opportunity to appear today to discuss the Kyoto Protocol and the significant impacts the treaty would have on the electric utility industry, my company, and our customers that would be affected by higher electricity rates.

My name is Paul Agathen and I'm senior vice president for energy supply services at Ameren Corporation, headquartered in St. Louis, Missouri. We serve 1.5 million electric customers and 300,000 natural gas customers in Missouri and Illinois. Other than normal utility services provided under state approved tariffs, I am not aware of any Federal grants or contracts in the current fiscal year.

We at Ameren, like many other electric utilities, have been successful in the past by giving our customers two things -- excellent service and reasonable, competitive prices. Today, our prices are reasonable and affordable. They certainly won't remain that way if the Kyoto Protocol is ratified by the Senate or if it is implemented through the back door, specifically through regulatory means prior to Senate approval of the protocol.

As an example of back door implementation, I would refer you to an internal memorandum from the Environmental Protection Agency (EPA) Office of Policy, Planning, and Evaluation dated May 31, 1994. This memorandum includes a list of "proposed additional actions for the Climate Change Action Plan." At the top of the list is a proposal to "Establish Hazardous Air Pollutant Standards (HAPS) for Greenhouse Gases as a Backstop for the Action Plan." The EPA memorandum indicates that regulation of CO₂ could be accomplished through a regulatory proceeding, although "such aggressive use of Clean Air Act authority" might not be well received by Congress. Recent developments suggest that EPA will act upon its proposal to establish HAPS for CO₂.

Earlier this month, EPA published a Federal Register notice of a proposed settlement agreement under the Clean Air Act that was filed with the U.S. Court of Appeals for the District of Columbia on April 15, 1998. The June 2 notice states that a lawsuit was filed alleging "failure" by EPA to "list, and determine whether to regulate" several named hazardous air pollutant emissions from electric utilities, including CO₂. This notice appears to be misleading since, as far as our trade association can tell, no new lawsuit has been filed. In fact, the settlement is entitled "Stipulation for Modification of Settlement Agreement." This refers to modifications to a 1994 agreement that was entered into between EPA and the Natural Resources Defense Council (NRDC) for implementation of a HAPS study.

Despite assurances to several congressional committees in February and March 1998 by Under Secretary of State Stuart Eizenstat that the Administration would not take any action

to implement the Kyoto Protocol prior to ratification by the U.S. Senate, EPA's modification agreement covers the greenhouse gas CO₂. While EPA's General Counsel concluded that CO₂ met the Clean Air Act's statutory definition of an "air pollutant," he also said that that alone really meant little because it does not assure that EPA could ever subject it to regulation under the applicable tests required to be met before regulation. As many have observed, sound science would likely not support CO₂ being defined as a pollutant since it is essential to plant life and the life of all of us.

Nothing in the Clean Air Act imposes a duty on EPA to list and regulate CO₂ (nor SO₂ or NO_x for that matter) as a hazardous air pollutant. Thus, there is no failure to act as indicated in the June 2 notice. Nonetheless, EPA appears to be moving forward with an effort to implement the regulation of CO₂ – as would be required under the Kyoto Protocol – prior to ratification of the protocol by the U.S. Senate.

Aside from our concerns about the Kyoto Protocol, I want to be clear. We in the electric utility industry take seriously our responsibility to protect the environment and have made significant strides in meeting that responsibility.

Our industry is active in voluntary efforts to enhance and protect the environment. In 1993, Edison Electric Institute initiated, with the Department of Energy, a voluntary, collaborative effort involving more than 600 electric utilities to address greenhouse gas emissions. That program, the Climate Challenge, is the world's largest and most successful voluntary

environmental initiative. In fact, the Department of Energy projects that in the year 2000, Climate Challenge participants will reduce, avoid or sequester 172 million metric tons of carbon dioxide-equivalent greenhouse gases.

The Climate Challenge program consists of numerous activities by 643 individual utilities and 9 industry-wide initiatives to achieve the reduction, avoidance, or sequestration of greenhouse gas emissions. My own company is involved in 19 Climate Challenge projects. For example, we have committed \$5 million to help support the \$52 million EnviroTech Fund to develop more efficient energy technologies. Another example is our GreenLeaf program. Ameren annually funds GreenLeaf grants ranging from \$50,000 to \$100,000. Through these grants, schools, parks, and other facilities benefit from landscaping and energy conservation projects. We also contribute to a regional ground source heat pump program. The result of all these initiatives is that Ameren has reduced almost 8 million tons from 1991 through 1997.

In addition, Ameren has long promoted programs related to energy efficiency, recycled products, waste reduction, and protection of wildlife and wilderness areas. We recently received national and state recognition for several projects designed to improve Missouri's Lake of the Ozarks and expand facilities at the World Bird Sanctuary. We strive to protect the environment while offering quality service at affordable prices.

At Ameren, we take pride in our environmental stewardship, service, and prices. However, the requirements inherent in the Kyoto Protocol could have a severe economic impact on our

company, resulting in higher prices for our customers and reduced funding for voluntary environmental initiatives.

The Administration, last December in Kyoto, negotiated a protocol that, according to numerous studies and analyses¹ would place great stress on the U.S. economy, lead to a significant loss of jobs, and force a reduced lifestyle on our citizens. These studies indicate that electricity prices could increase substantially. One study conducted by Charles River Associates and DRI/McGraw-Hill for the Electric Power Research Institute indicates that industrial electricity prices could rise significantly across the U.S. In Missouri, for example, industrial electricity prices could increase 54.4 percent, according to that study.

The Charles River Associates and DRI/McGraw-Hill study, and others, point to a scenario dramatically different from the Administration's own recent economic testimony. While Dr. Janet Yellen, chair of the Council of Economic Advisors, has stated repeatedly that she expects the economic impact and electricity price increases to be minimal, those predictions are based upon extremely optimistic – and unlikely – assumptions.

One of the underlying assumptions in Dr. Yellen's testimony is developing country participation. However, developing countries, especially China and India, have steadfastly

¹ For example: Resource Data International, Inc. *At What Cost? Federal Environmental Regulations in a Competitive Electricity Marketplace*, May 1998, and *The Kyoto Protocol: Putting U.S. Electricity Supply and GDP at Risk*, February 1998; WEFA, Inc. *The Kyoto Protocol: Severe Economic Consequences*, Testimony of Mary H. Novak, Sr. Vice President, WEFA, Inc., March 5, 1998, and *Global Warming: The Economic Cost of Early Action*, 1997; and Charles River Associates, *Economic Implications of the Adoption of Limits on Carbon Emissions from Industrialized Countries*, November 1997.

refused to make any commitments to limit or reduce their emissions. In fact, during the recent United Nations climate change meetings in Bonn, Germany, developing nations reiterated their strong opposition. In a June 12, 1998 statement, the Ambassador of the Republic of Indonesia, on behalf of the Group of 77 and China, stated:

The COP-4² should not be distracted by issues which are extraneous to the letter and the spirit of the Convention, namely through introduction of any new commitments for the developing country Parties . . . The Group reiterates that there must be no new commitments, voluntary or otherwise, introduced for all developing countries, under any guise in such reviews.

Questions of fairness and trade implications aside, without the participation of developing countries, it is doubtful that reductions by the United States and other developed nations alone would have any positive impact on atmospheric concentrations of greenhouse gases.

Bert Bolin, former chairman of the Intergovernmental Panel on Climate Change (IPPC) – the United Nations body charged with the science of climate change – first raised this point in February 1995 when he stated that the impact of proposals under consideration then for reductions only by developed nations “would not be detectable on projected temperature increases.”

The Administration further assumes in its economic testimony that international emissions trading will reduce economic impacts in the U.S. While such a program could potentially reduce the cost of achieving the Kyoto requirements, trading is only a concept in the protocol and key details about principles, rules, and methods of verification and accountability are not

² The fourth meeting of the Conference of the Parties to the United Nations Framework Convention on Climate Change to be held in Buenos Aires, Argentina in November 1998.

addressed. Virtually no progress was made on these details at the recent Bonn meetings. The way the trading program is structured and administered will affect its usefulness in reducing costs. Given the difficulties that the U.S. negotiators faced in Kyoto and Bonn, it is far from certain that an international emissions trading program can be structured so as to render true benefits.

Furthermore, there are proposals, such as one by the European Union, which would limit the percentage of a country's reduction requirements that could be achieved through non-domestic programs like the Clean Development Mechanism (CDM) and trading. A paper presented in Bonn on June 5, 1998 by the United Kingdom of Great Britain and Northern Ireland, on behalf of the European Union (EU) and eight other nations, summarizes the EU's position on the principles, modalities, rules, and guidelines for an international emissions trading framework. The EU calls for a system that ensures that "trading is supplemental to domestic action for the purposes of meeting commitments" and that "domestic actions should provide the main means of meeting commitments . . . [and that] a 'concrete ceiling' on the use of all the flexible mechanisms has to be defined . . ." Developing nations and environmental organizations also support limitations on the use of trading and other flexible mechanisms.

The U.S. opposes limitations on the use of flexible mechanisms. In fact, the Administration apparently assumes no such limitations in discussions of the economic impacts of the Kyoto Protocol. However, the outlook for unrestricted use of trading and other market mechanisms to meet the requirements of the protocol is not promising.

So, despite reassuring promises of minimal economic impacts, the Kyoto Protocol has a very real potential to raise significantly the cost of electricity and, in the process, to wreak havoc on our economy.

The impact of the treaty on the electric utility industry is clearly illustrated in a recent study conducted by Resource Data International (RDI). The study, just released last month by the Edison Electric Institute, assesses the impact of the Kyoto Protocol, as well as all the current U.S. Environmental Protection Agency air regulatory initiatives, on the electric industry. I will first address the Kyoto portion of the RDI study.

The RDI study estimates that to meet the 7 percent reduction below 1990 levels requirements of the Protocol, a "31 percent reduction from anticipated aggregated emissions" in our industry would be necessary. Of course, this assumes that all segments of society and the economy share equally in the burden; any policy decision that would not equitably distribute the burden could increase this estimate.

The RDI study also states that:

massive reductions in coal-fired generation would be required. Given the fact that there are no commercially viable CO₂ removal technologies, replacement of coal-fired generation with lower CO₂ emitting sources of generation is the only reduction option available to the electric industry. RDI's analysis indicates that 36 percent of current U.S. coal-fired generation may need to be removed from the generation mix in order to meet the Kyoto target.

The study points out, along with an earlier RDI study³, that natural gas generation would have to replace a significant amount of the reduced coal generation. Other fuel sources, such as nuclear, hydroelectric, and renewables, might be used to replace a portion of coal generation, but various factors, including governmental policies and environmental concerns, limit their prospects.

For example, nuclear power accounts for about 20 percent of electricity generation today, but no new nuclear plants are being planned and many of those currently in operation face impending retirement due to relicensing difficulties and cost pressures in a competitive market. Hydroelectric also faces relicensing difficulties and environmental constraints. Renewables, such as wind and solar, are expected to capture only about 3 to 4 percent of the market in 2010, according to the Energy Information Administration. Renewables also face other difficulties, including economics, resource availability, and, in the case of wind, environmental concerns.

The most recent RDI study indicates that “the stresses to the electricity and natural gas generation would be enormous” and that “even if wind and solar generation increase by almost 500 percent and natural gas increases by 170 percent from 1997 levels, the nation would still be faced with a 19 percent gap in available generation to meet the projected electricity supply in 2010.”

³ Resource Data International, *The Kyoto Protocol: Putting U.S. Electricity Supply and GDP at Risk*, February 1998.

We estimate that Ameren would need to replace about 90 percent of the roughly 20 million tons of coal that we now burn with natural gas to meet the Kyoto Protocol requirements. Such a shift to natural gas generation is a serious concern. One reason is that the cost of natural gas is higher than coal.

A February 1998 RDI study indicates that gas generation costs are 1.9 times those at existing coal-fired plants.⁴ The Energy Information Administration (EIA) recently estimated that the cost of natural gas will be about 2.6 times the cost of coal in 2010.⁵ Based on the EIA's projected prices for coal and natural gas in 2010, a kilowatt hour of electricity that now costs 7 cents would cost about 25 percent more. This example, however, represents only the increase in the cost of fuel. There would be additional costs, including construction of new pipeline capacity to get the natural gas to our plants, not to mention the environmental regulatory process that would have to be navigated to obtain site approvals. There would be capital costs to modify our plants to burn natural gas and finally, there would be natural gas price increases due to greater consumption throughout the U.S.

These cost increases could be devastating to our customers. Small businesses, farmers, large manufacturers who employ thousands of workers, individual consumers, including those with limited incomes, would all feel the effects of the Kyoto Protocol.

⁴ Ibid.

⁵ Energy Information Administration, *Annual Energy Outlook 1998*. Calculated from Table A3, Energy Prices by Sector and Source, p. 104.

Proponents of the treaty have said that any increase in prices to customers can be offset by implementing retail competition in the electric utility industry. It would be wrong to take from our customers the possible cost savings from restructuring of the electric utility industry to pay for the costs of compliance with environmental regulations under global climate change protocols or the Clean Air Act. Moreover, it would be unfair to single out the electric utility industry to the exclusion of other industries and other sectors of the economy. Why should our electric customers bear the brunt of the costs of compliance with international treaties addressing global climate change? Furthermore, the laws of economics work in both directions – prices can rise as well as fall. In that context also, prices are more likely to increase if the supply is curtailed due to costly retrofits, reduced supply of natural gas, or pipeline constraints. As a result, the projected savings from industry restructuring would be lost.

The Kyoto Protocol is just one environmental initiative facing our utilities. The EPA has promulgated or proposed other regulations addressing ozone, ozone transport, fine particulates, and regional haze, to name a few. To meet the requirements of these initiatives alone, the recent RDI study estimates, will require a capital investment of \$22 billion dollars and annual operation and maintenance expenditures of \$15 billion. Add in the costs of the Kyoto Protocol and the cost pressures of restructuring, and some power plants will be closed prematurely. The RDI study estimates that 21,000 megawatts of power are at risk. All of our customers will pay the price for these decisions.

As the Intergovernmental Panel on Climate Change (IPCC) reported in 1995, "Our ability to quantify the human influence on global climate is currently limited because the expected signal is still emerging from the noise of natural variability, and because there are uncertainties in key factors." Given the uncertainties expressed by the IPCC, the scientific doubts raised by numerous others, and the significant economic risks not only for our industry and our customers, but also the nation as a whole, we have to ask: Does it make sense to move forward with the requirements agreed to in the Kyoto Protocol – either formally or through back door implementation?

On behalf of the electric utility industry, I say no. We believe that such action simply is not good public policy. We do not suggest, however, that we sit back and do nothing. Indeed, we have demonstrated our commitment to address potential climate concerns through Climate Challenge and other voluntary programs. What we do suggest is that greenhouse gas emissions be addressed through similar voluntary, cost-effective, and flexible actions by all industries and all nations. Such efforts can be effective and they can be accomplished without risking serious economic harm.

Thank you for allowing me to speak today about this very important issue.

Testimony of
Mr. Chris Farrand
Vice President Corporate Affairs, Peabody Group

**House Subcommittee on National Economic Growth,
Natural Resources and Regulatory Affairs**

**Economic Impacts of the Kyoto Protocol -
Effects on the Coal and Electric Utility Sectors**

June 24, 1998

Mr. Chairman, Members of the Subcommittee.

My name is Chris Farrand; I am Vice President for Corporate Affairs of Peabody Group. In behalf of my company, I want to thank you for the opportunity to present to the Subcommittee our concerns about the economic impacts of the Kyoto Protocol on Climate Change.

Peabody is the world's largest private coal producer and largest fuel supplier to the U.S. electric utility industry. Our products fuel more than nine (9) percent of all U.S. electricity generation. Our subsidiary, Citizens Power, is one of the top ten power marketers in the United States. Not surprisingly, we have focused our attention on the effects of the Kyoto Protocol on coal and electricity markets. Peabody engaged Resource Data International, Inc. (RDI) to examine the impacts the Kyoto Protocol would have on the U.S. electricity supply and the domestic economy.

The results of the RDI study and our thesis here today is that the U.S. electric utility industry will not be able meet projected power demand if the Kyoto Protocol to the Framework Convention on Climate Change is implemented. Because economic growth is closely tied to the availability of electricity, the shortfall in electricity will have a major negative impact on U.S. economic growth. Moreover, the projected shortfall in power supply and economic growth will be felt disproportionately in the interior region of the country.

Before I summarize the findings of the RDI study, I want to state for the record that Peabody strongly opposes the Kyoto Protocol. First, we are not convinced by the scientific evidence to date that the potential for adverse climate change is imminent. Further, we are not convinced that the actions called for in the Kyoto Protocol will have any real impact on the global climate. We are convinced that if the Kyoto Protocol enters into force, this nation's economy will suffer significant harm with little or no environmental benefit. The essence of the Kyoto Protocol can be captured in a trite but apt phrase – “All Pain and No Gain”.

The RDI Study

Let me now try to summarize for the Subcommittee the findings of the RDI study, which is entitled: *The Kyoto Protocol – Putting US Electricity Supply and GDP at Risk*. RDI is one of the preeminent analytical firms that specializes in energy markets – particularly the coal, electricity and gas markets. In this study, RDI has derived its analysis primarily from the energy and economic projections contained in the Energy Information Administration's *Annual Energy Outlook 1998*.

Assumptions about Emissions Trading

At the outset we should state that RDI's analysis assumes unrestricted CO2 emissions trading on a domestic basis but does not assume any international trading.

There are provisions in the Kyoto Protocol to allow emissions trading among developed countries – the so-called Annex I countries that are affected by the emission reduction commitments. There are also provisions in the treaty to establish a Clean Development Mechanism under which Annex I countries may receive credit for emission reductions in developing countries, or non-Annex I countries. Just as there are no monitoring or enforcement provisions in the treaty, there is no language in the treaty to define how these international emissions trading mechanisms will work. The most recent attempt to define them was not successful.

At the U. N. climate change negotiating session that concluded two weeks ago in Bonn, no progress was made in defining trading mechanisms, and we have no way of judging whether such mechanisms, if finally given definition, will be effective. The prospects for an effective international trading mechanism appear dim. Among Annex I countries, only Russia, the Ukraine and perhaps some eastern European countries are projected to have any surplus emission allowances available in the 2008-2012 timeframe. Moreover, the European Union, developing countries, and most treaty advocates want to restrict the ability of the United States and other Annex I countries to meet their reduction targets through the purchase of emission reductions in other countries. Those who would restrict trading seem more interested in punishing the advanced economies like the United States than they are in solving a perceived climate problem.

In fact, there is a fundamental deadlock concerning the treaty itself. At the Bonn negotiating session, developing countries remained adamantly opposed to discussing even voluntary emission reduction contributions. On the other hand, the Administration has publicly maintained that "meaningful" contributions to greenhouse gas emission reductions from developing countries are necessary before the United States can implement the treaty. Under these deadlocked circumstances, we are hard pressed to see how the President can reverse himself and sign the treaty or how the Senate can ratify it.

Suffice to say RDI found it impossible to calculate the potential benefits of an international emission-trading program so lacking in both definition and prospect. With that caveat, let me outline the findings of the RDI study.

Results of the RDI Study

The primary conclusions of the RDI study are:

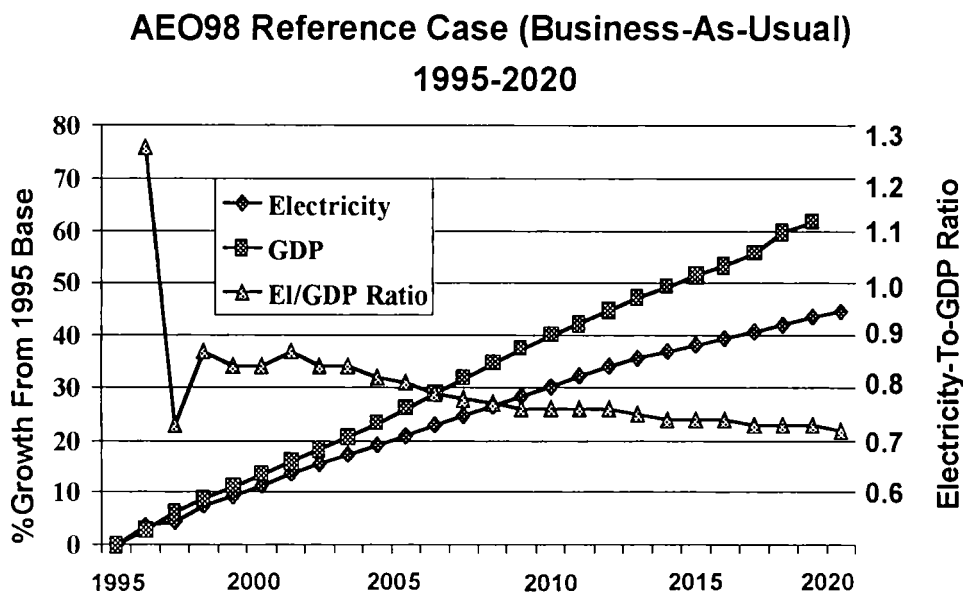
1. Electricity rates will increase significantly.

The electricity sector will need to spend \$68.7 billion to replace high carbon emitting generation sources in 2010 alone in order to comply with a 7 percent reduction from 1990 carbon emission levels. This is in addition to the \$46.5 billion that the federal government would collect if it chooses to sell carbon emission permits to the electricity sector at a price of \$100 per ton. These cumulative one-year costs of \$115 billion in 2010 are more than half of the entire revenues of the electricity industry last year – about \$215 billion.

2. The prescribed carbon controls would put the U.S. economy at risk.

Growth in the U.S. economy has historically been closely linked to the growth in electricity supply. The ratio of 1995 to 1996 electricity growth-to-GDP growth was 1.30 percent. Every 1.3 percent growth in the electricity supply produced a 1.0 percent growth in GDP. Meeting the carbon emission reduction requirements of the Kyoto Protocol will limit the annual growth in electricity supply between 1995 and 2020 to 0.84 percent, far less than the 1.42 percent forecast under Department of Energy's projected business-as-usual scenario. Neither natural gas nor carbon-neutral generating sources will be able to offset the electricity shortfall.

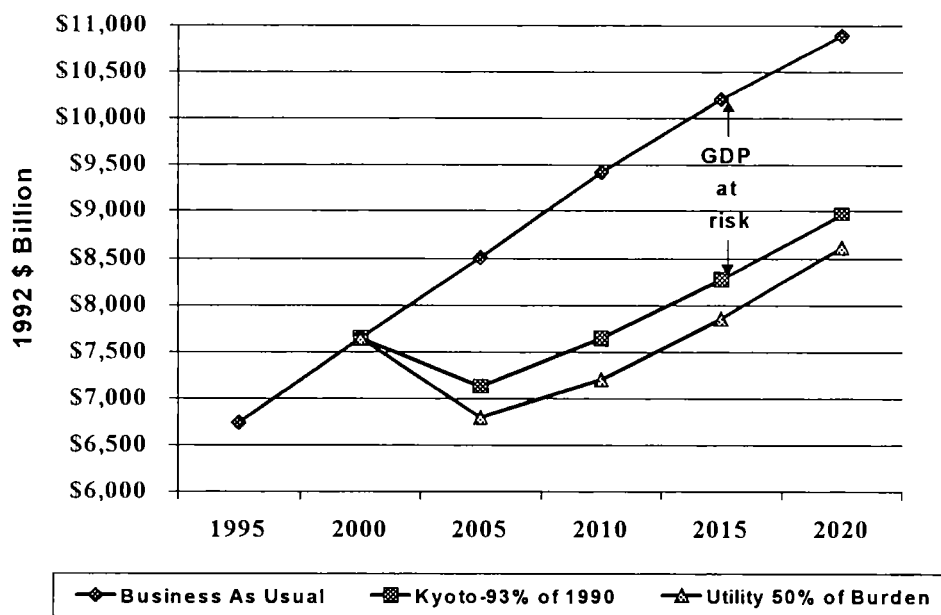
AEO98 Electricity vs. GDP Growth, 1995-2020



Source: Resource Data International, Inc, 1998

If the electricity sector is called upon to reduce its proportionate share of carbon emissions (approximately 35 percent), up to \$1.8 trillion or 19 percent of GDP could be at risk in 2010 as a result the electricity shortfall. On a cumulative basis, as much as \$28.2 trillion could be at risk in the years between 2005 and 2020. The results are even greater if the electricity sector is called upon to bear 50 percent of the carbon emission reduction requirements, a solution that may be politically expedient though painful for the consumer.

GDP Projections, 1995-2020



Source: Resource Data International, Inc, 1998

3. Proposed CO2 emissions trading proposals are not a panacea.

The sulfur dioxide emissions trading program under the Clean Air Act Amendments of 1990 has been cited as the model for a carbon trading program under a climate change treaty. Power plants would

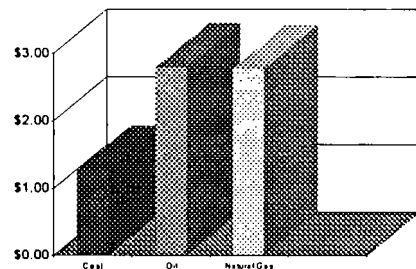
need to combust a lower carbon fuel - most likely switching from coal to natural gas. If, as a result of switching, emissions fell below the allowable level, the excess reduction could be traded to offset emissions from another source, which presumably has a higher cost of control.

The success of the SO₂ trading program lies in the ability of the power plants to switch from high sulfur coal to low sulfur coal. Because low sulfur coal is now generally less expensive than high sulfur coal, overcompliance with the acid rain program produced a surplus of emission allowances which could be traded. There are no “low carbon” sources of coal, and natural gas is a higher cost fuel alternative. In 1997, the average megawatt-hour cost of generating electricity from natural gas (\$35.12/MWh) was more than twice the average cost of coal-fired electricity (\$17.24/MWh).

Cost of Electricity Generation

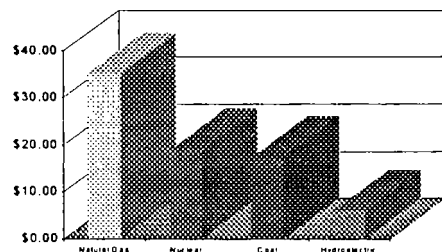
- Average 1997 fuel prices delivered to US generating plants (cost/MM Btu):

Heavy Oil	\$ 2.79
Natural Gas	\$ 2.77
Coal	\$ 1.27



- 1997 average total generating costs (per MWh):

Natural Gas	\$35.12
Nuclear	\$18.98
Coal	\$17.24
Hydro	\$ 5.86

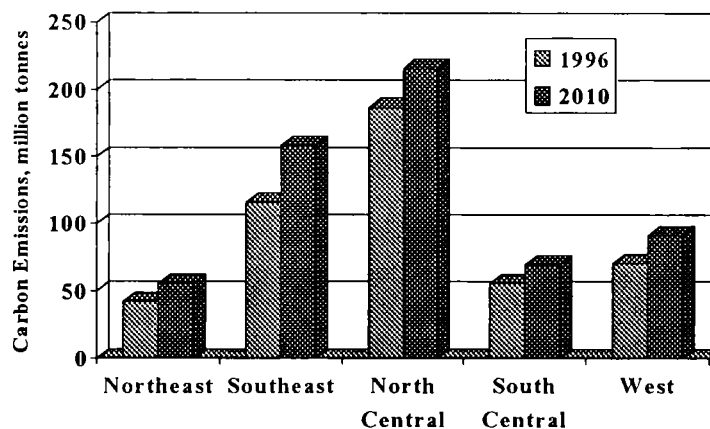


Based on monthly operating data
Source: Resource Data International, 1998, modeled costs

4. Carbon emission reductions will disproportionately impact the U.S. interior states.

The Northeastern and Western states have greater access to hydroelectric, nuclear, natural gas and renewable energy resources than the interior regions. As a result, these states generate electricity at a less carbon-intensive ratio but at a higher cost. The interior states relied upon coal-based generation for 72 percent of their electricity in 1995 while the other states in coastal regions relied upon coal for only 35 percent of generation. That relationship is projected to be maintained through 2010.

Regional Carbon Emissions



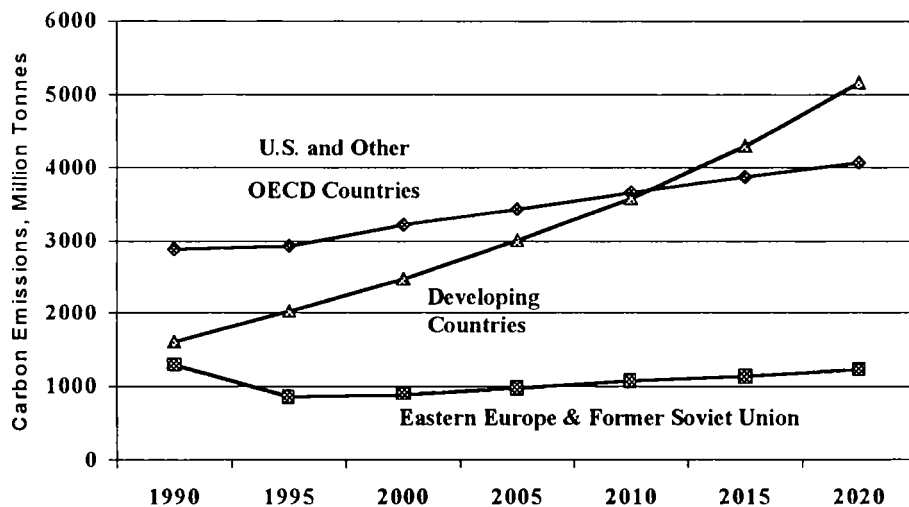
The economies of the interior states are more electricity-intensive than the economies of the states in the coastal regions, using about 0.51 tWh (TerraWatthour) per \$1 billion of Gross State Product,

compared to 0.38 tWh for the coastal states. Reductions in coal-based generation to meet carbon limitations will therefore have a disproportionate effect on the interior states.

5. U.S. efforts to reduce carbon will have diminishing returns.

Of the world's manmade carbon emissions, the United States emitted 24 percent in 1995 but is projected to emit only 19 percent by 2020 under the EIA's business-as-usual scenario. Before 2015, carbon emissions from developing countries will exceed those of the OECD countries. The projected difference between carbon emissions from developing countries and OECD countries will rapidly increase and exceed one billion metric tons ("tonne") per year by 2020. Even if the

Developing Country Emissions



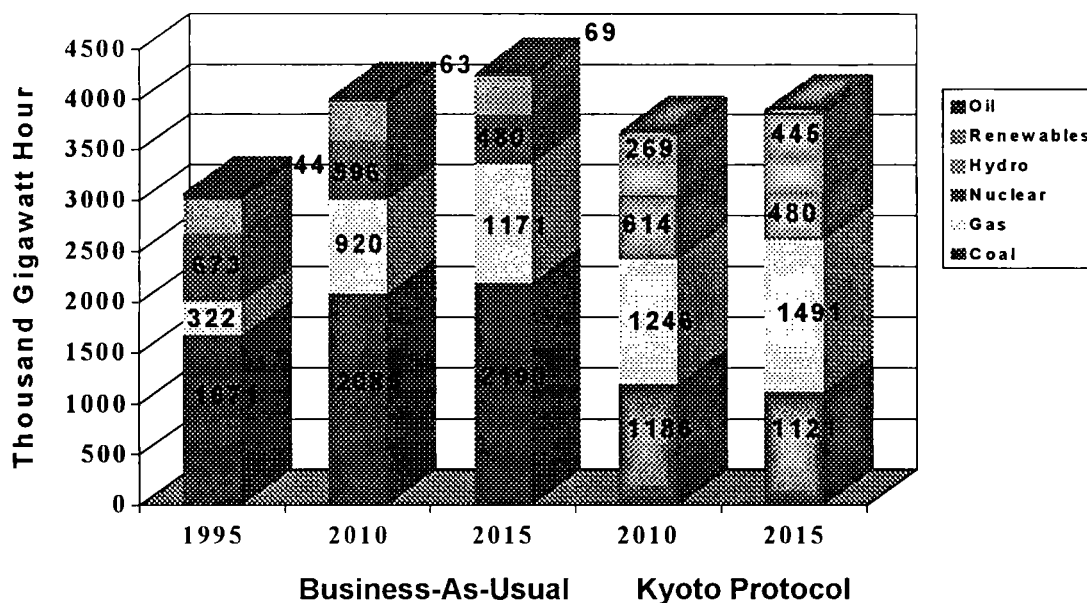
Source: Energy Information Administration, IEO98, April, 1998

Annex I countries meet their Kyoto emission reduction commitments, emissions from non-Annex I countries will more than offset these reductions. During the first 5-year commitment period, 2008 to 2012, the cumulative carbon emission reductions of 4,025 million tonnes from OECD countries will be offset by increases from 1990 levels of 9,772 million tonnes from developing countries.

6. Summary of RDI study.

The RDI study concludes that the emission limitations of the Kyoto Protocol would result in a reduction in projected coal-fired generation of nearly 44 percent by 2010 and 50 percent by 2015.

U.S. Generation under the Kyoto Protocol



Source: "The Kyoto Protocol, Putting US Electricity Supply and GDP at Risk," Resource Data International, February 1998

The RDI study analyzed all available alternative sources of generation, including natural gas, nuclear, hydropower, wind, solar, geothermal and biomass. Because coal's share of generation is so large – 57 percent in 1997 – and because the required reductions in coal-based generation would be so great, no other source or combination of sources will be available to make up the shortfall. Growth in electricity supply is necessary for continued economic growth, and, even with DOE's projected improvement in the electricity-to-GDP ratio, the electricity shortfall resulting from the Kyoto Protocol will have a very detrimental effect on the U.S. economy.

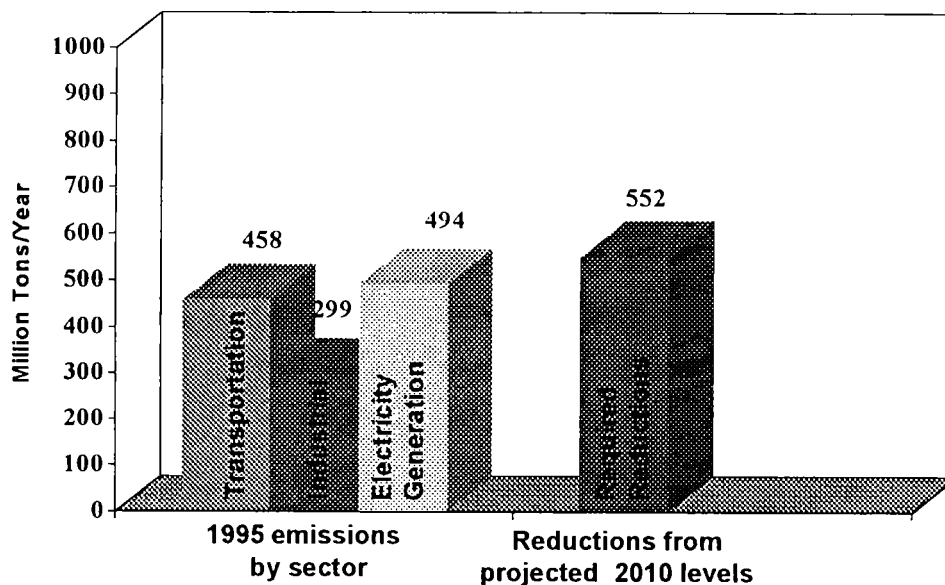
Magnitude of Emission Reductions

While we have focused on the impacts of the Kyoto Protocol on the electricity sector and the resulting effects on the economy as a whole, it is useful to put in context the total carbon emission requirements to be imposed upon the United States.

To meet the target emission level of 93 percent of 1990 emissions, the United States will have to reduce carbon emissions from the projected 2010 level by 552 million annual tonnes. This emission reduction is more than the entire electricity sector emitted in 1995 (494 million tonnes), and it is nearly twice as much as the entire industrial sector emitted in that year (299 million tonnes). To put it another way, if every car, truck, boat, train, and airplane were removed from our travel-ways, the resulting emission reduction (458 million tonnes) would not be sufficient to meet the demands of the Kyoto Protocol. If one third of all the 1995 emissions from all these sectors combined were eliminated (417 million tonnes), the emission reduction obligation of the United States still could not be met (552 million tonnes).

US Emission Reductions

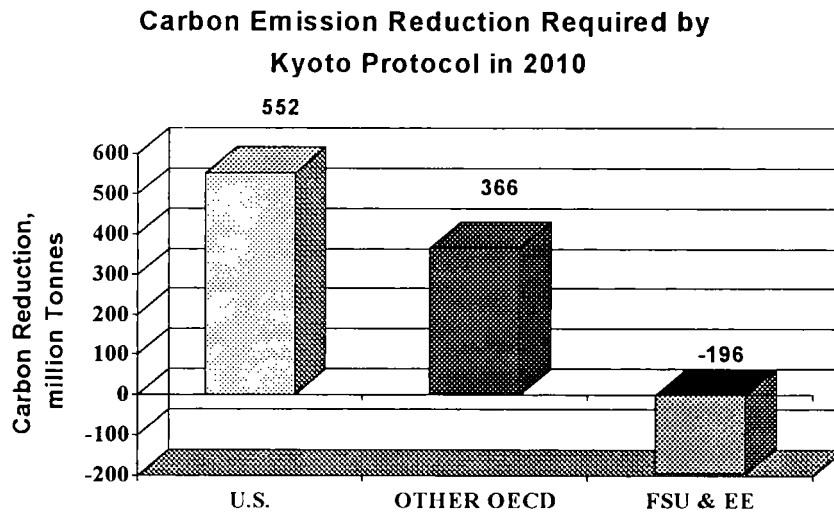
US Carbon Emissions Vs. Reduction Requirements



Energy Information Administration, 1997

To put the U.S. emission reduction obligations in an international context, the 552 million annual tonnes of carbon reductions the United States will achieve in 2010 compares very unfavorably and unfairly with the 366 million tonnes of annual reductions to be achieved by the other OECD countries combined. The projected carbon emission reduction obligations of the United States are larger than all of the other affected countries put together. Clearly, these disparate reduction requirements will affect our national competitive position in the world marketplace.

Disproportionate Reductions



Source, Energy Information Administration, IEO98, April, 1998

Conclusion

From the perspective of Peabody Group as the largest coal producer and a significant participant in the electricity market, the prospect of the Kyoto Protocol's implementation is daunting. There should be no mistake about our opposition to this treaty.

But even the unbiased observer - even one who has sincere if unfounded concerns about global warming - must question how and why the U.S. negotiators in Kyoto could have agreed to a protocol that is so obviously harmful and unfair to the United States and so patently ineffective in solving the problem some scientists have suggested.

I appreciate the opportunity to present Peabody's views to the Subcommittee, and I would be happy to respond to any questions.

**Statement of
Cecil Roberts, President
United Mine Workers of America
before the
Committee on Government Reform and Oversight
Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs
U.S. House Of Representatives
June 24, 1998
The Economic Consequences of Climate Change**

Mr. Chairman and members of the subcommittee, I appreciate the opportunity to share with you our views on the economic consequences of the Kyoto Protocol¹. The United Mine Workers of America became involved in the climate change debate because of concerns about the effect of the treaty on coal miners' jobs. We have participated in every negotiating session at the United Nations for the past several years. The UMWA has spent a considerable amount of time trying to understand the economic implications of the Kyoto Protocol. Based on extensive economic analysis, we have become convinced that the effects of the protocol go far beyond impacts on the coal industry. We believe that the Kyoto Protocol will have serious negative effects on U.S. jobs, economic growth, family incomes and trade, but will have almost no positive effects on carbon concentrations.

The Kyoto Protocol calls upon the United States to reduce emissions of a basket of six greenhouse gases 7% below 1990 levels by 2008-2012. Greenhouse gases subject to controls under the protocol are carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆). Carbon dioxide comprises about 85% of the volume of U.S. emissions of greenhouse gases, although

¹ Data presented in this testimony are derived from "The Impact of Meeting the Kyoto Protocol on Energy Markets and the Economy," June, 1998, prepared for the UMWA-BCOA Labor Management Positive change Process (LMPCP) Fund by Standard & Poor's DRI.

some of the other gases have higher global warming potentials. The Kyoto agreement contemplates the use of market-based mechanisms such as emissions trading among Annex I countries², Joint Implementation (JI) projects among developed countries and a Clean Development Mechanism (CDM) for project-based emission reductions in developing countries to minimize the cost of compliance.

The protocol implies that the United States will have to reduce its emissions of greenhouse gases by approximately 500 million tonnes of carbon equivalent in the 2008-2012 period. This represents a reduction of about 30% from business as usual in the compliance period. Assuming that the cap on emissions remains through 2020, emissions would have to be reduced about 35% below Base Case levels. Although the post-2012 obligations are undefined, if the U.S. maintains this emissions target, reductions will be 640 million tonnes by 2020. The U.S. could meet its obligations through a combination of lower fossil fuel use, reductions of gases with higher global warming potentials, enhancement of sinks, emissions trading with other Annex I parties, JI projects, and through CDM projects with developing country parties.

Although the rules have not yet been written for the market-based mechanisms, the analysis we have conducted assumes a generous amount of U.S. reliance on these mechanisms. Table 1 below shows the assumed U.S. reductions and the offsets from the other market mechanisms. The analysis assumes that the U.S. must reduce emissions by an average of 497 million tonnes of carbon equivalent in 2008-2012. Of this total 207 million tonnes, or about 42%, comes from other gases, sinks, trading, JI and CDM projects. The remainder, about 290 million tonnes, is derived from domestic actions, such as energy conservation and switching away from carbon-intensive fuels.

There are several factors that lead us to believe that these assumptions are generous. First, the marginal cost of control in the United States is likely to be less than that of other Annex

² Annex I countries include the United States, Canada, Australia, New Zealand, Japan, nations of the European Union, and emerging economies in eastern Europe and the former Soviet Union.

I countries, since the U.S. is relatively less energy efficient than Europe and Japan. Thus, these countries are likely to set the clearing price for trading emissions. Obviously, if Japan or the EU bids up the price of allowances above the cost of domestic control then reductions will occur domestically. Clearly, Japan is moving ahead with its plans to trade. Russian President Boris Yeltsin and Prime Minister Ryutaro Hashimoto signed an agreement in April to begin feasibility studies on twenty joint implementation projects.

Second, several parties have expressed concern about the role of these market-based mechanisms in compliance. Chairman Estrada³, the European Union, the Group of 77 and China, and environmental organizations all have recently made public statements that indicate they are uncomfortable with the notion that the U.S. may achieve significant portions of its reductions off-shore. At the most recent U.N. negotiating session in Bonn, Germany earlier this month it became clear that these parties intend to restrict the amount of trading that can be used to comply with the reduction obligations. While the U.S. took the position that there should be no limits on trading, the EU tabled a paper that would require that the majority of reductions occur domestically. The Group of 77 and China took the position that trading and other flexible mechanisms were intended under the protocol to be a supplement to domestic action, not a substitute for domestic reductions. Chairman Estrada expressed his concern about creating a "commodity" of pollution rights. And finally, a number of environmental organizations took the position that trading should be limited to 10% to 30% of any country's reduction effort.

As I said our analysis assumes considerable use of trading and the other flexible mechanisms to achieve U.S. compliance. This assumption may be overly optimistic, because if this coalition forces a limitation on the amount of emissions trading that can be used to achieve compliance, the costs in the U.S. will escalate dramatically.

³ Ambassador Raul Estrada Oyeda, the representative of Argentina, chaired the negotiations that led to the Kyoto Protocol.

Table 1
U.S. Required CO₂ Reductions and Offsets
(Million Tonnes of Carbon Equivalent)

Year	2008	2009	2010	2011	2012	2015	2020
Gross Reductions	458	478	497	519	531	591	643
Other Gases	-20	-20	-20	-20	-20	-20	-20
Sinks	-40	-40	-40	-40	-40	-40	-40
Trading & JI	-132	-127	-121	-113	-112	-98	-79
CDM	-23	-24	-25	-26	-27	-30	-32
Net Reductions	243	267	291	315	333	404	471
Percent of Gross	53%	56%	59%	61%	63%	68%	73%

Where Will the Offsets Come From?

Only the former Soviet Union states and eastern European nations have immediately available excess emissions, with Russia and Ukraine holding the largest share. This results from the collapse of the economies of these countries following the breakup of the Soviet Union. Environmental groups have dubbed these excess allowances “hot air” and are pressuring the delegates to prohibit trading of such hot air emissions. Our analysis estimates that these countries combined will have 193 million tonnes of excess emissions available for trading in 2008, declining to 34 million tonnes in 2020. Therefore the selling parties will be the nations of the former Soviet Bloc, particularly Russia. The buying nations will include the U.S., Canada, Australia, New Zealand, Japan, and possibly the nations of the European Union.

Interestingly, Russia issued a draft analysis in Bonn that speculated that it may have no immediately available excess emissions for trading. The Russian paper stated that emissions were 3.04 billion tonnes of CO₂ equivalent in 1990, falling to 2.15 billion tonnes in 1994. The

paper goes on to state that “in 2010, under extensive economic recovery, emissions will return to about 3 billion tonnes CO₂-equiv./yr. Thus, all Russian emission trading potential may be eliminated by business as usual extensive development.” Whether this proves to be factual or is just a preliminary negotiating posture to bid up the price remains to be seen.

Carbon Permit Prices and Energy Prices

Carbon permits will act like a carbon tax on the economy. Whether imposed directly by the government in the form of a tax or by the market in the form of permit prices, end-user energy prices will rise, and the increased costs of doing business will ultimately be passed on to consumers. Table 2 below shows the percentage price increases for several important forms of energy.

Our economic analysis assumes that the carbon permit program is gradually phased in beginning in 2000 to ease the price shock to the economy. Carbon permits are granted to businesses by the federal government, rather than auctioned. The carbon permit price necessary to achieve the required reductions (in 1997 dollars) is \$100-130 per tonne, if the assumptions outlined above for trading, JI, CDM, sinks and other gases are achieved. If these market mechanisms are restricted by the treaty, carbon permit prices are likely to increase to the range of \$150-200 per tonne, and end-user energy prices will increase proportionately.

Table 2
Real Energy Prices
Percent Above Base Case

Year	2008	2009	2010	2011	2012
Gasoline	15.7%	17.2%	18.2%	18.8%	19.6%
Natural Gas	24.6%	26.1%	27.9%	30.0%	31.2%
Electricity	32.2%	34.5%	36.6%	38.6%	40.0%

All forms of fossil energy will experience price increases. Gasoline prices are projected to increase 21-27¢ per gallon over the base case in the 2008-2012 period. Residential natural gas prices are projected to be \$1.47-1.89 per million Btu higher in 2008-2012, and electricity prices are projected to be 1.82-2.41¢ per kilowatt-hour higher than the base case.

The Economic Cost of Kyoto

Achieving the required reductions in carbon emissions will require substantial investments by both businesses and consumers to improve energy efficiency and to substitute lower-carbon sources of fuels for higher-carbon fuels. These investments will result in the diversion of funds from savings or investment in other things, such as housing, education or health care.

Numerous economic analyses, including some draft analyses by the Clinton Administration, indicate that efforts to meet the obligations arising out of the Kyoto protocol will be quite costly. Over a million American jobs could be lost, and the losses will occur in every region of the country. Among those most affected are coal miners, utility workers, railroad workers, aluminum workers, paper workers and cement workers. Nearly every sector of the economy, including service industries and state and local governments, could be affected. The loss of high paying mining and manufacturing jobs, along with the general decline in other jobs, will lead to a severe reduction in wage growth, further exacerbating the widening disparity of wealth in America. And greenhouse gas reduction efforts are likely to increase the U.S. trade deficit as exports of U.S. goods decline and imports increase.

The loss of real GDP would be significant under the proposed Kyoto Protocol. Based on the trading assumptions outlined above, the decline in GDP would be about 1.2% on average in the 2008-2012 compliance period. This represents economic losses in excess of \$100 billion per year, and cumulative losses from 2001 to the end of the initial compliance period in 2012 would

be about \$1.1 trillion. Cumulative losses would continue to grow beyond the initial compliance period, assuming that the emissions cap is maintained post-2012. While 1.2% may sound like a small price to pay, one can get some sense of the magnitude of these losses when measured against common federal expenditures. For example, the U.S. government spends a similar amount each year on transportation, community and regional development, education, training, employment and social services. We spend only about twice that amount each year on Medicare. And it is about half of what we spend each year as a nation (combined federal, state and local expenditures) on elementary and secondary education. Clearly, the costs of Kyoto are large and significant.

Another way to measure the magnitude of the economic losses is to consider them on a per-person or per-household basis. Our analysis indicates that GDP losses would exceed \$400 per person in 2010 and GDP losses per household would be nearly \$1,200 in the same year. Cumulative GDP losses from 2001 to the end of the initial 2012 compliance period would be over \$4,000 per person and nearly \$12,000 per household.

As energy prices increase and our economy slows, jobs will be lost. Our analysis indicates that implementation of the Kyoto Protocol would result in the loss of nearly 1.3 million jobs in 2005. Job losses are expected to occur in every region of the country and in every sector of the economy, with the exception of the federal government. From a regional perspective, the interior regions of the country will be hit the hardest. This is because of their heavy reliance on fossil fuel production and consumption. For example, while coal is used to generate about 56% of electricity nationwide the share of coal-fired electrical generation is much higher in the nation's heartland. In addition, the interior regions of the country tend to rely much heavier on energy-intensive industries for economic activity than the coastal regions. Therefore, the burden of the reduction obligations fall more heavily on the interior than on the coasts. Nonetheless, every region of the country will experience a loss of economic output and jobs.

Job losses are also expected to occur in every sector of the economy. Industries

associated with high-carbon fuels such as coal mining and coal-fired electricity are hit especially hard, but the impacts are much broader. Job losses will occur in construction, manufacturing, transportation and public utilities, services and state and local governments.

As job losses occur and wage growth is constrained, families will lose income. Our analysis indicates that the nation will lose in excess of \$115 billion per year in real disposable income. Over the initial 2008-2012 compliance period, there would be a cumulative loss of \$600 billion in lost real disposable income.

One aspect of this debate that needs much more attention is the regressive distributional effects of higher energy prices. Energy taxes are highly regressive by nature. Regardless of income, families must heat and cool their homes, cook their food, wash their clothes and travel to work. For example, the U.S. Department of Energy estimates that a family with an annual income of less than \$10,000 still spends nearly \$1,000 per year in energy costs in the home. Energy taxes, or equivalent carbon permit schemes, will be crushing for low-income workers and seniors living on fixed incomes. There needs to be more analysis of the distributional effects of greenhouse gas reduction policies.

The Environmental Impact of Kyoto

Despite the substantial economic costs, the Kyoto Protocol will accomplish almost nothing environmentally. Dr. Bert Bolin, former head of the U.N. Intergovernmental Panel on Climate Change (IPCC), recently wrote in Science magazine that if we do nothing global concentrations of carbon dioxide will be 383 parts per million (ppm) in 2010. With full implementation of the Kyoto Protocol, carbon dioxide concentrations will be 382 ppm. In other words, over a million workers could lose their jobs, and the nation could spend over \$100 billion per year for a treaty that will reduce carbon dioxide concentrations by only one part per million in 2010.

The reason that Kyoto will have almost no effect on carbon concentrations is because nations that will soon emit more than half of the world's greenhouse gases are exempt from any reduction obligation under the treaty. The fast-growing developing economies in China, India, Mexico and elsewhere will offset reductions made in the United States and other Annex I countries.

The Role of Developing Countries

Mr. Chairman, as you know the U.S. Senate unanimously adopted last year Senate Resolution 98, which called upon the President not to accept a treaty that did not include commitments from developing countries. President Clinton last October said that the U.S. would not take on legally binding emission reduction obligations unless there was "meaningful participation from key developing countries." The Kyoto Protocol contains no such commitment from developing countries.

No progress was made on this issue in the recent Bonn meeting. Developing countries, led by China and the G-77, vociferously opposed including any discussion of developing country commitments on the agenda for the Buenos Aires meeting of the Conference of the Parties (COP-4) this fall. China even opposed any discussion of voluntary commitments by developing countries. A provision for such voluntary commitments was deleted from the Kyoto Protocol during the final days of negotiations last December, and it is clear that China intends to keep it off the table.

Coal and the American Economy

Mr. Chairman, if I might I would like to spend a few moments talking about the issue that led us to become involved in the international climate change negotiations--the effect on the coal industry. Almost every analysis we have seen concludes that the coal industry will take a severe hit from efforts to reduce greenhouse gases. A number of environmental organizations have

expressed the view that the U.S. could reduce greenhouse gas emissions “simply” by replacing coal in our electric utility grid. While this is true in theory, it could not be accomplished simply, or without significant cost. Coal provides the fuel for some 56% of U.S. electricity generation, by far the single largest source of electricity. In some regions of the country, coal provides about 75% of electricity generation. Replacement of this amount of generating capacity would take an enormous amount of capital investment, and create issues of stranded costs that would dwarf the ongoing debate on electricity deregulation. Aside from the capital costs, where would we find the fuel to replace more than half our electricity output? Nuclear power is unable to take up the slack since most nuclear plants operate at high capacity. Moreover, many nuclear power units are nearing the end of their operating licenses. Hydro power is unlikely to pick up any demand since we have no ability to expand hydro generation. Indeed, in western states there are attempts to tear down hydro-electric dams and let the rivers go back to their original state. Other renewable technologies, like wind and solar power, have made little inroads into the national electricity grid.

That leaves natural gas as the only reasonable substitute for coal. But we must question how reasonable. Natural gas currently costs about twice as much as coal. While coal prices are stable and fairly predictable, that may not be the case with natural gas. Wholesale conversion from coal to gas would raise questions of both supply and price. Do we have enough natural gas to make such a conversion? Would we be trading a domestic supply for one that inevitably will lead to greater imports? If we have enough gas, what will be the price in the short run and the long run?

Perhaps a more basic question on the minds of coal miners is what happens to them. What happens to their families and their communities should the nation decide that the product they produce is no longer acceptable for electricity generation. Coal mining is a unique industry. It is located in isolated rural areas of the country that have little or no alternative employment opportunities. For many of these communities, coal mining defines the term “one-industry town.” If the coal mining jobs disappear, the engine that drives the local economy comes to a

halt. The burdens of these policies will not fall evenly across all regions or industries. But we know that coal miners and the communities that depend on them for economic sustenance will bear a heavy burden. I think coal miners and other workers deserve an answer to their question. What happens to them?

These are questions that we believe the Congress and the American people would want to answer before we embark on a program to replace our most abundant domestic source of energy. Unfortunately, it appears that the Administration intends to implement the treaty without the constitutional obligation of submitting the treaty to the U.S. Senate for ratification. A variety of activities are underway or planned by the EPA to force utilities to switch away from coal. We believe that it is wrong to attempt to achieve backdoor implementation of a treaty that the Administration admits could not survive Senate ratification. The UMWA does not believe that the President should sign the Kyoto Protocol. However, if the Administration intends to implement the treaty, it should submit the treaty to the Senate so the American people can express their judgment on its merits.

Conclusion

Mr. Chairman, the White House has been highly critical of those who have expressed concern about the economic cost of the Kyoto Protocol. We all know that economic models--like the computer models used to project future climate trends--are limited in their ability to predict the future. We do not claim to be prescient, nor do we think that our analysis represents the only reasonable set of likely economic outcomes from compliance with the protocol. We do believe, however, that the analysis is an honest attempt to estimate the costs, not one based on overly optimistic or pessimistic assumptions.

In testimony before the House Science Committee, Dr. Janet Yellen, Chair of the White House Council of Economic Advisors, recently testified that the Administration believes that the Kyoto agreement can be implemented at a very low cost to the economy. This is based on an

assumption that 85% of the emission reductions contemplated in the protocol can be achieved through sinks, other gases and purchases of emission credits off-shore. Our analysis indicates that the costs may be much more substantial.

Surprisingly, it appears that in the absence of assumptions about the role of trading and other market mechanisms, the White House analysis and ours come to similar conclusions. When we utilize assumptions similar to those used by the Administration, the model yields similar results. In other words, it appears that we both come to approximately the same economic results before making assumptions about how much of the reduction must be achieved domestically and how much can occur off-shore. This is a guess on our part, however, because the White House will not release its underlying economic studies.

The real question is whether the White House assumptions or those used in the UMWA-BCOA analysis are more reasonable. Having heard the debate on the role of trading and flexible mechanisms at the most recent negotiating session in Bonn, it is hard for us to accept that the White house assumptions represent a reasonable expectation of the outcome of COP-4 in Buenos Aires. As I said earlier, there are growing indications that the EU, the G-77 and China along with environmental groups will seek to limit significantly the role that these mechanisms can play in compliance. The more limits are placed, the higher the cost to our economy because the reductions will necessarily be made domestically, arguably at a higher cost. For example, if trading and other mechanisms are limited in our analysis to about 25% of compliance, the costs increase by 50% or more.

Vice President Gore, in his book *Earth in the Balance*, wrote extensively about efforts to combat climate change. At the time he said:

“Minor shifts in policy, marginal adjustments in ongoing programs, moderate improvements in laws and regulations, rhetoric offered in lieu of genuine change--these are all forms of appeasement, designed to satisfy the public's desire to believe that

sacrifice, struggle, and a wrenching transformation of society will not be necessary.”
(emphasis added).

Sacrifice, struggle and a wrenching transformation of society.

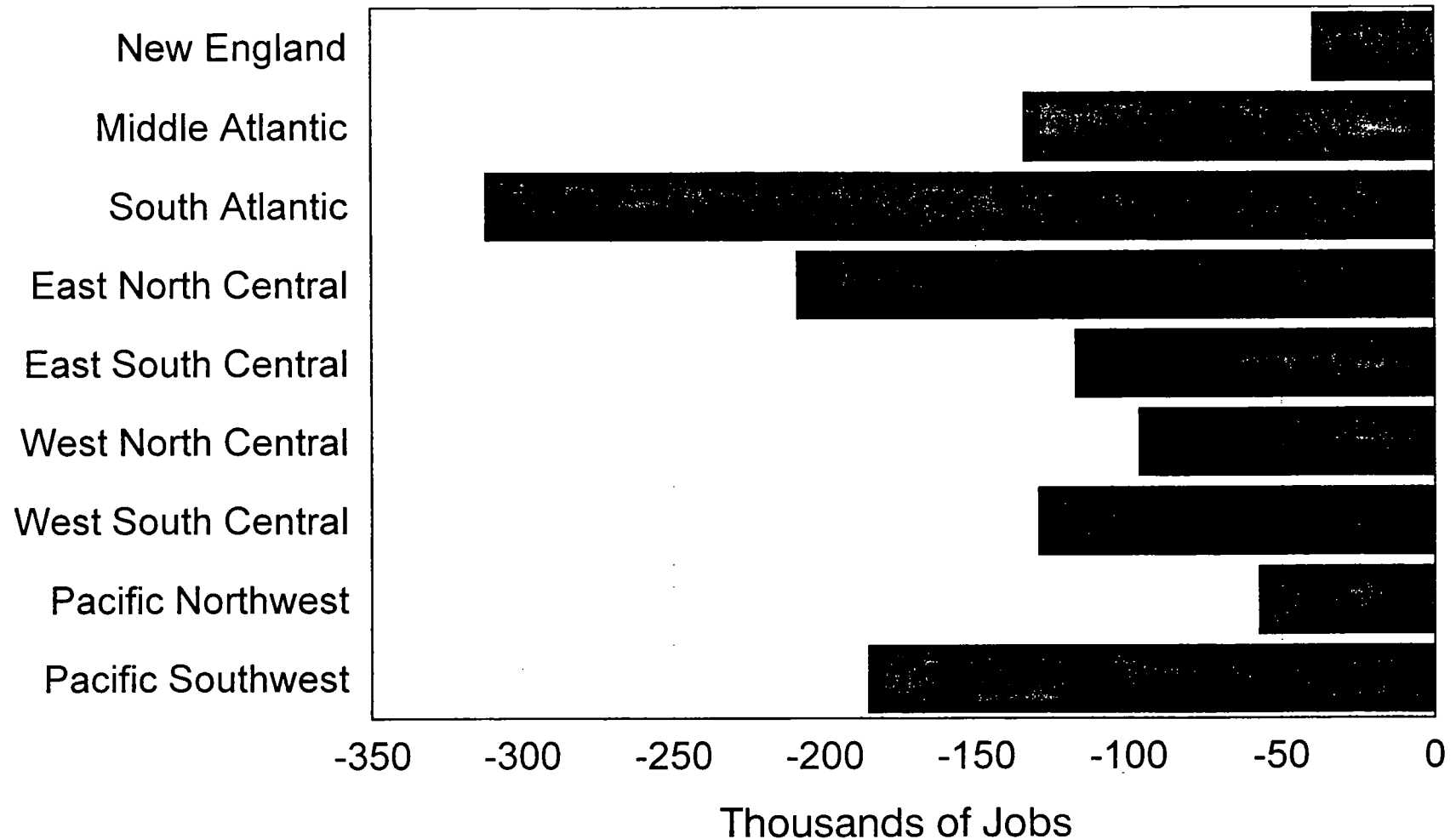
These are words that we are unlikely to hear from the White House in this debate, because they have chosen to downplay the costs by making rosy assumptions that may well prove to be false. Our analysis leads us to believe that Mr. Gore understood the costs better several years ago.

The question for the American public is whether the benefit of this policy--a decline in carbon concentrations of about one part per million--is worth over a million lost American jobs and over \$100 billion per year in lost economic output. The UMWA thinks it is not.

Mr. Chairman, I appreciate the opportunity to appear before the subcommittee. I hope that our economic analysis will add something useful to the subcommittee's consideration of this issue. I would be happy to answer any questions that you may have.

Employment Losses by Region

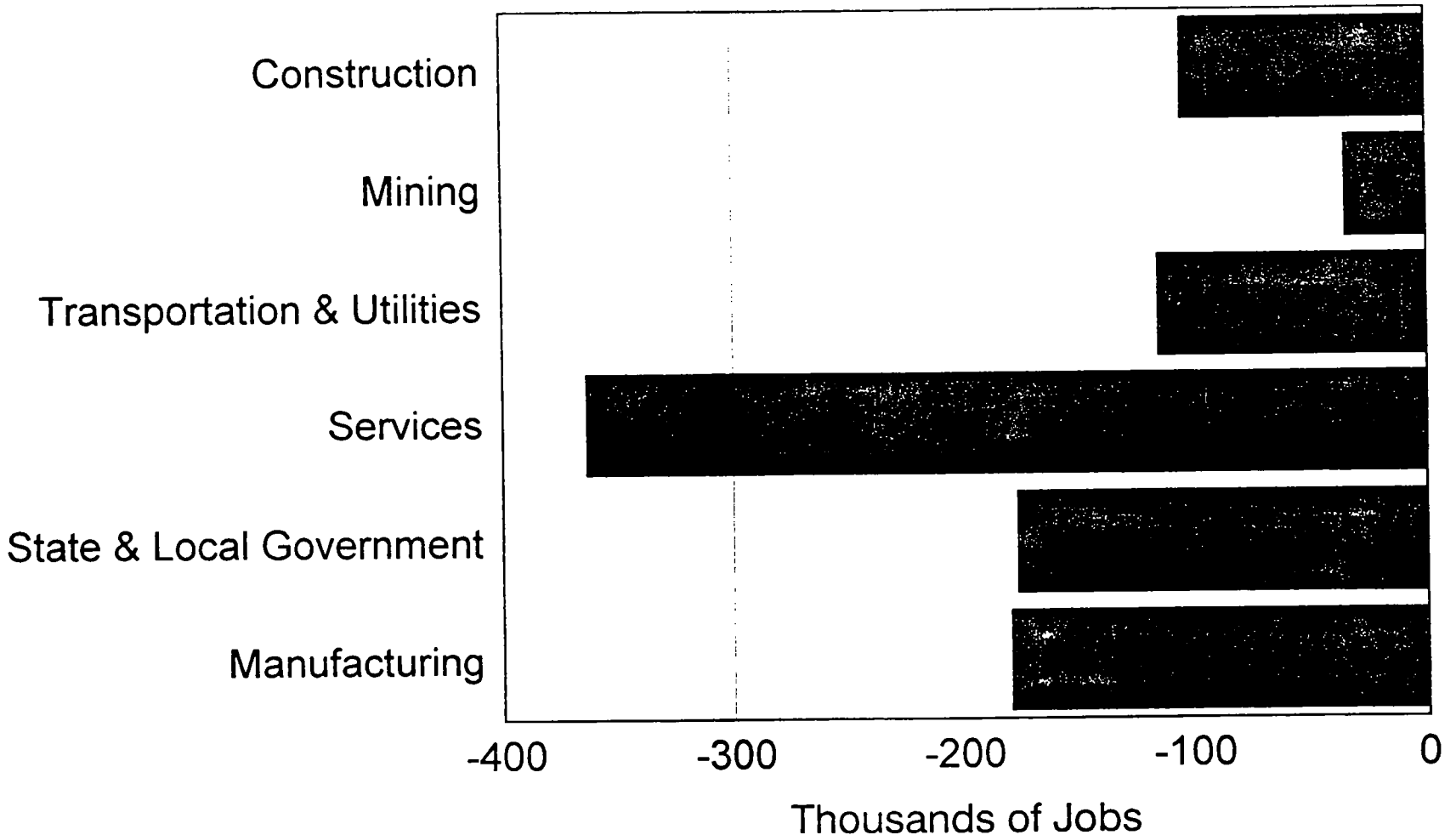
From the Kyoto Protocol in 2005



Source: Standard & Poor's DRI

Employment Losses by Industry

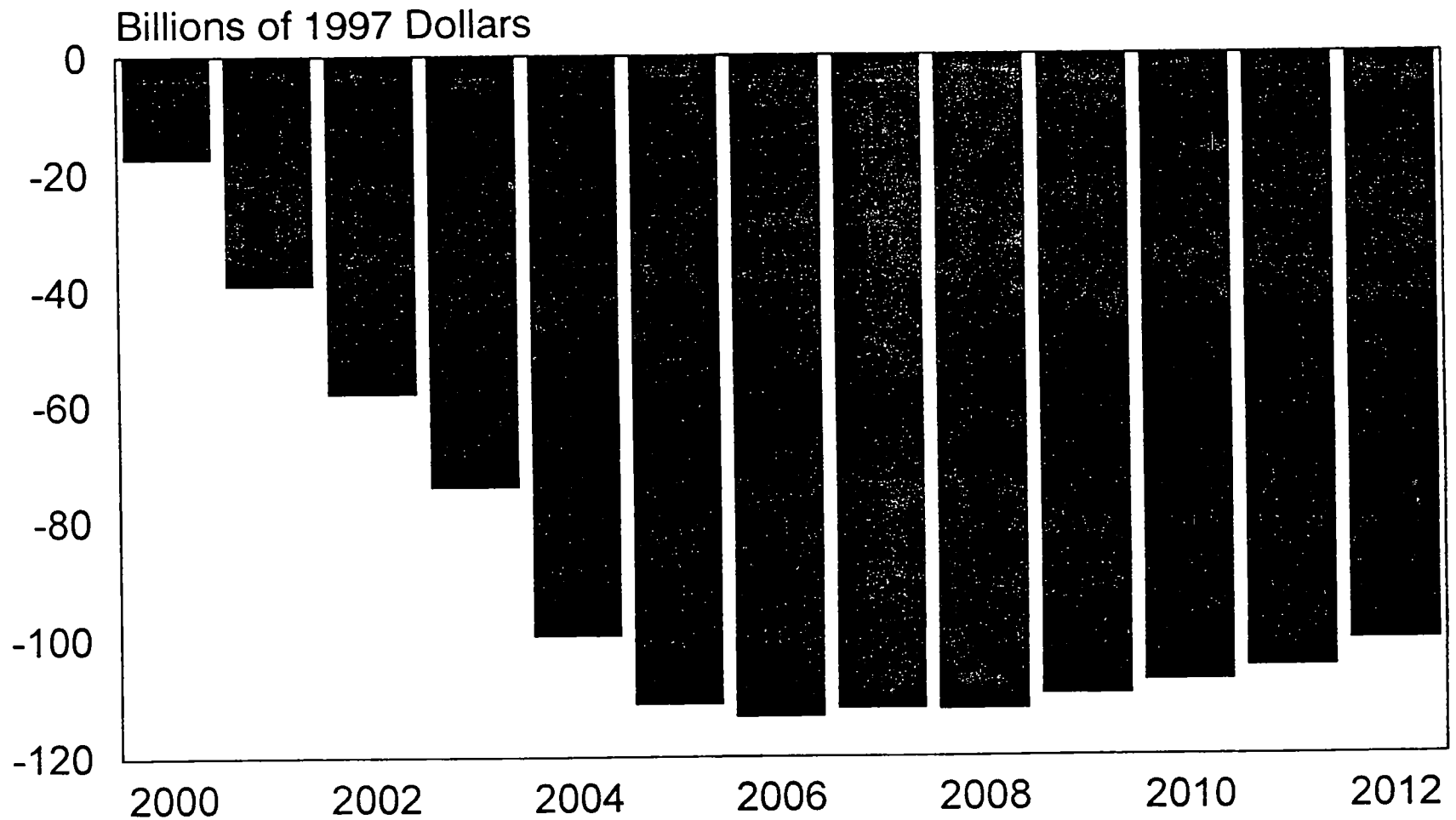
From Kyoto Protocol in 2005



Source: Standard & Poor's DRI

Annual GDP Losses

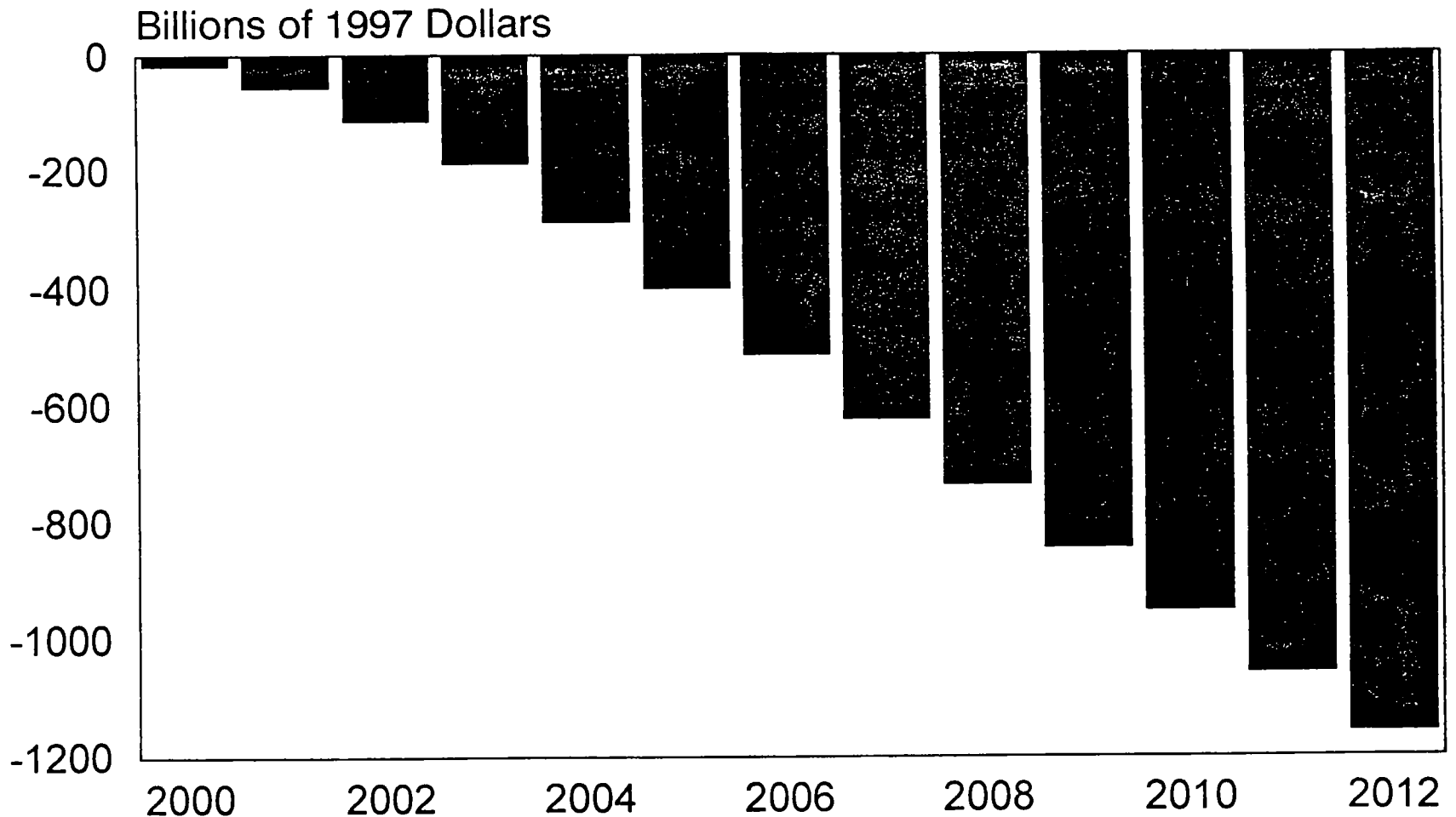
From the Kyoto Protocol (2000-2012)



Source: Standard & Poor's DRI

Cumulative GDP Losses

From the Kyoto Protocol (2000-2012)



Source: Standard & Poor's DRI

Industry Employment, Case 2 versus Base Case
Thousands of Persons

	Difference (000s)				% Difference			
	2005	2010	2015	2020	2005	2010	2015	2020
Nonagricultural Establishments	-1288.83	-1135.85	-669.41	-174.52	-1.0	-0.8	-0.5	-0.1
Contract Construction	-103.97	-11.31	32.27	40.36	-1.8	-0.2	0.5	0.7
Finance, Insurance & Real Estate	-2.69	16.60	22.61	27.26	0.0	0.2	0.3	0.3
Mining	-34.30	-60.38	-74.80	-79.83	-6.5	-12.4	-16.9	-20.3
Coal Mining	-21.10	-28.74	-31.05	-28.84	-24.0	-36.1	-43.6	-47.3
Crude Petroleum	-7.24	-7.14	-8.14	-5.88	-3.7	-4.1	-5.3	-4.4
Natural Gas	0.76	-12.96	-22.32	-31.15	1.0	-16.6	-29.5	-44.5
Other Mining	-6.71	-11.55	-13.29	-13.96	-4.1	-7.4	-9.3	-11.0
Transportation and Public Utilities	-114.69	-171.54	-206.15	-222.78	-1.7	-2.5	-3.1	-3.5
Total Services	-363.48	-367.44	-218.14	-38.06	-0.8	-0.8	-0.4	-0.1
Retail Trade	-232.55	-128.78	38.23	173.43	-1.0	-0.5	0.1	0.7
Wholesale Trade	-82.10	-58.30	-38.57	-32.08	-1.2	-0.8	-0.5	-0.4
Federal Government	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
State and Local Governments	-176.17	-189.88	-86.15	52.23	-0.9	-0.9	-0.4	0.2
Manufacturing	-178.89	-164.82	-138.71	-95.06	-1.0	-0.9	-0.8	-0.6
Food and Products	-1.04	-4.21	-3.99	-0.08	-0.1	-0.3	-0.3	0.0
Tobacco Products	-0.01	-0.03	0.01	0.04	0.0	-0.1	0.1	0.4
Textiles and Products	-9.18	-10.12	-7.50	-3.05	-1.7	-2.0	-1.6	-0.7
Apparel and Products	-9.64	-11.67	-8.95	-4.42	-1.5	-2.1	-1.9	-1.1
Lumber and Wood Products	-16.76	-7.12	-1.79	1.91	-2.2	-0.9	-0.2	0.3
Furniture and Fixtures	-6.13	1.08	4.83	6.55	-1.2	0.2	1.0	1.5
Paper and Products	-6.67	-9.04	-8.92	-6.63	-1.0	-1.4	-1.4	-1.1
Printing and Publishing	-11.03	-12.86	-10.37	-5.46	-0.7	-0.8	-0.7	-0.4
Chemicals and Products	-9.84	-13.49	-13.26	-9.89	-1.0	-1.4	-1.3	-1.0
Petroleum Products	-4.01	-7.50	-9.19	-9.31	-3.8	-7.6	-10.5	-12.1
Rubber and Plastics Products	-7.32	-10.59	-11.35	-8.67	-0.8	-1.1	-1.2	-0.9
Leather and Products	-1.20	-1.59	-1.43	-0.86	-2.1	-3.4	-3.7	-2.6
Stone, Clay, and Glass	-8.54	-8.02	-7.50	-6.40	-1.6	-1.5	-1.5	-1.3
Cement	-0.87	-1.35	-1.61	-1.58	-4.0	-6.5	-8.3	-9.0
Other Stone, Clay, and Glass	-7.67	-6.67	-5.90	-4.82	-1.5	-1.3	-1.2	-1.0
Primary Metal Industries	-11.72	-16.39	-18.58	-17.04	-1.7	-2.5	-3.2	-3.2
Aluminum	-1.59	-2.19	-2.45	-2.05	-1.3	-1.8	-2.2	-2.1
Iron & Steel	-8.71	-11.84	-13.25	-12.46	-2.2	-3.1	-3.9	-4.1
Other Primary Metal Ind.	-1.43	-2.37	-2.88	-2.54	-0.9	-1.6	-2.1	-2.0
Fabricated Metal Products	-11.81	-9.25	-8.73	-7.59	-0.8	-0.6	-0.6	-0.5
Nonelectrical Machinery	-12.86	-3.65	-0.93	-3.29	-0.6	-0.2	0.0	-0.2
Electrical Machinery	-11.51	-14.45	-17.76	-13.73	-0.6	-0.8	-1.0	-0.8
Transportation Equipment	-5.51	2.16	5.44	4.67	-0.3	0.1	0.4	0.3
Instruments and Parts	-0.67	0.73	4.28	4.73	-0.1	0.1	0.6	0.7
Miscellaneous Manufacturing	-4.32	-4.92	-4.32	-2.80	-1.3	-1.5	-1.4	-1.0
Other Manufacturing	-4.86	-4.97	-4.06	-2.58	-1.0	-1.0	-0.9	-0.6

Exhibit 2
Impact of Carbon Permits on Industry Output, Top 25
Case 2: % Difference from Base Case, 2005

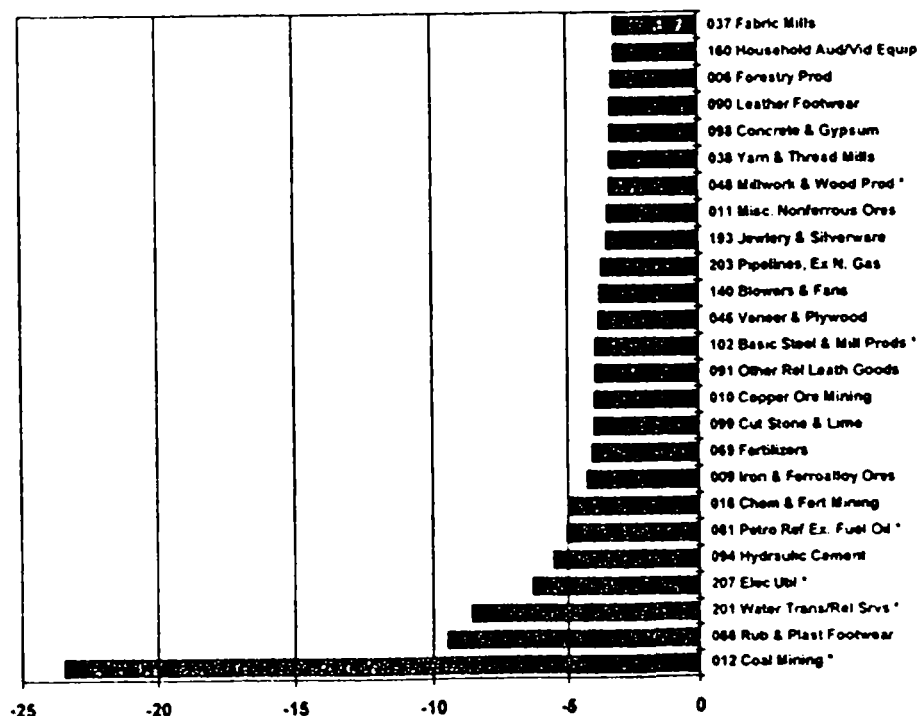


Exhibit 3
Impact of Carbon Permits on Industry Output, Top 25
Case 2: % Difference from Base Case, 2010

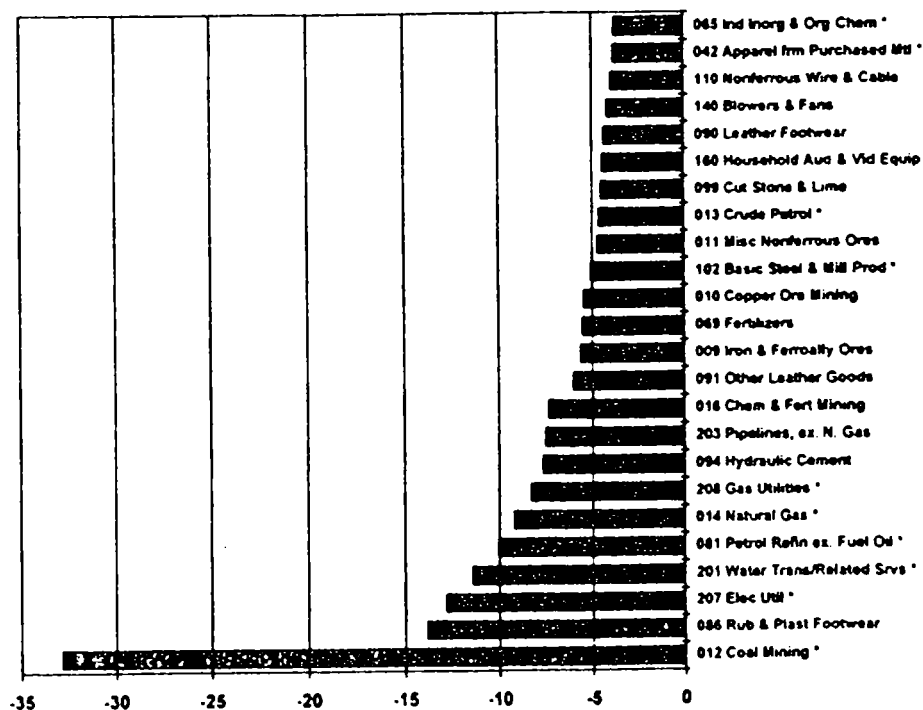


Exhibit 4
Impact of Carbon Permits on Industry Output, Top 25
Case 2: % Difference from Base Case, 2020

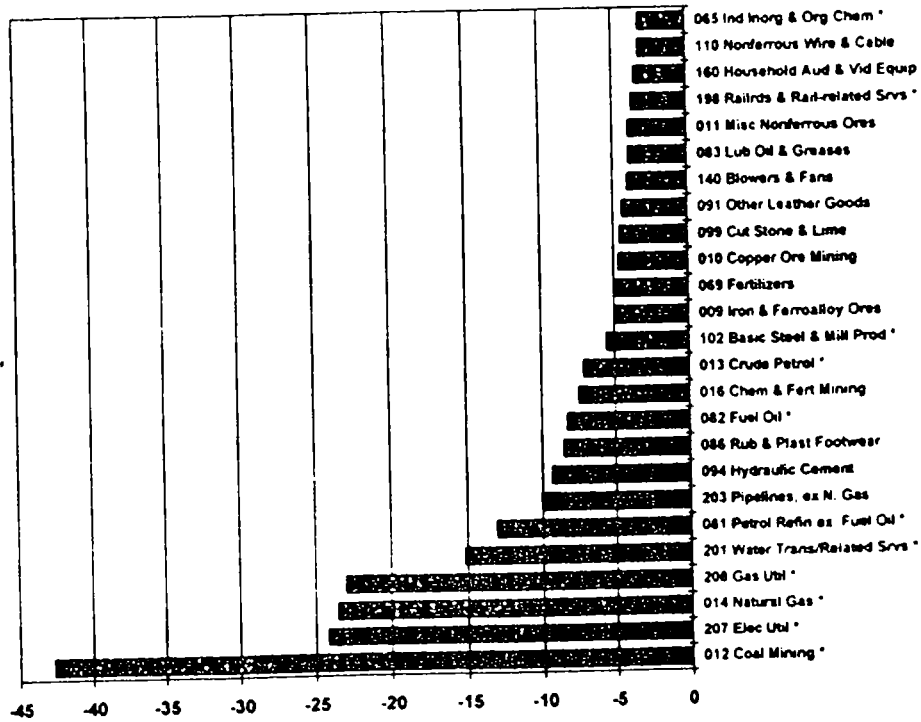


Exhibit 5
Employment Impacts—Manufacturing
Case 2: % Difference from Base Case, 2005

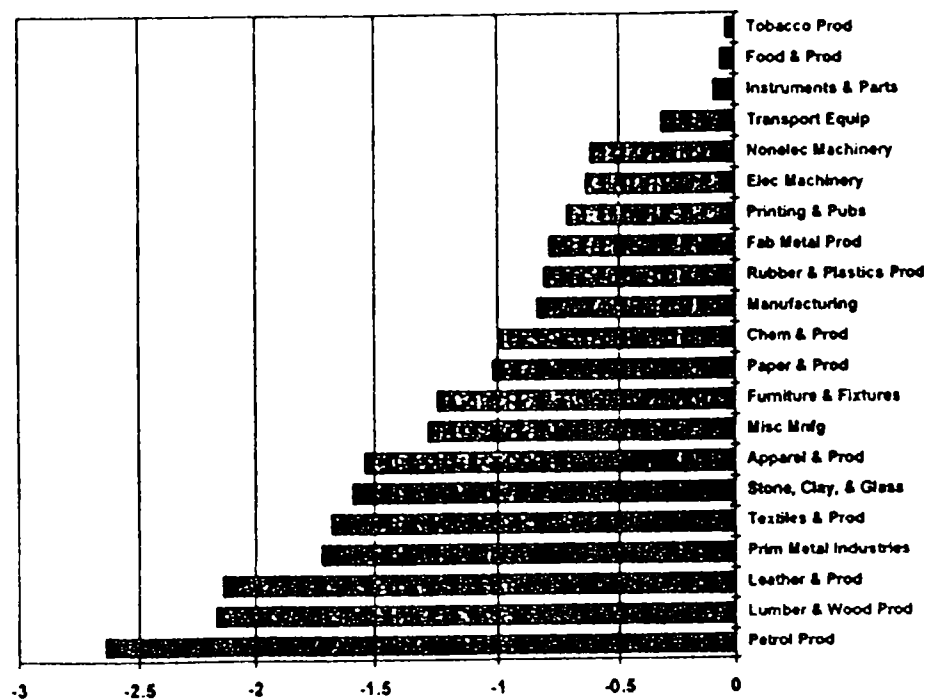


Exhibit 6
Employment Impacts—NonManufacturing
Case 2: % Difference from Base Case, 2005

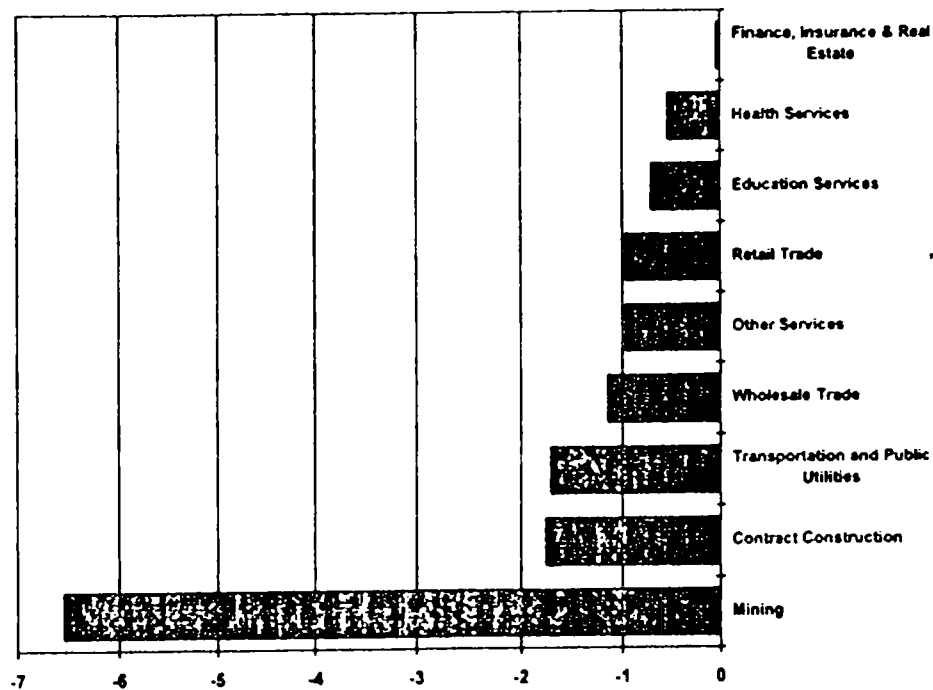


Exhibit 7
Employment Impacts—Manufacturing
Case 2: % Difference from Base Case, 2010

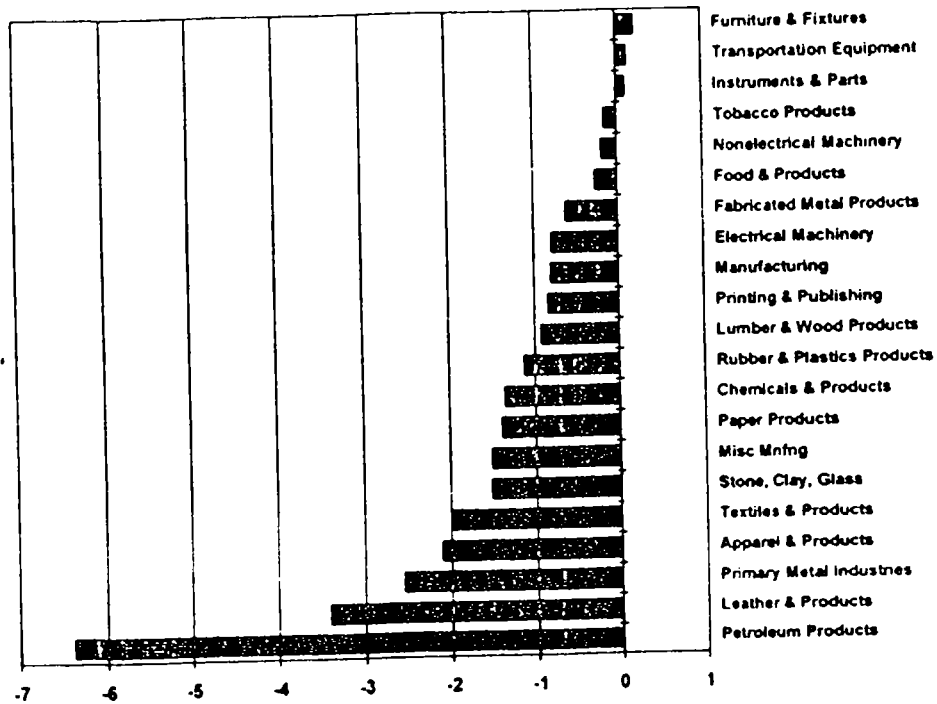


Exhibit 8
Employment Impacts—NonManufacturing
Case 2: % Difference from Base Case, 2010

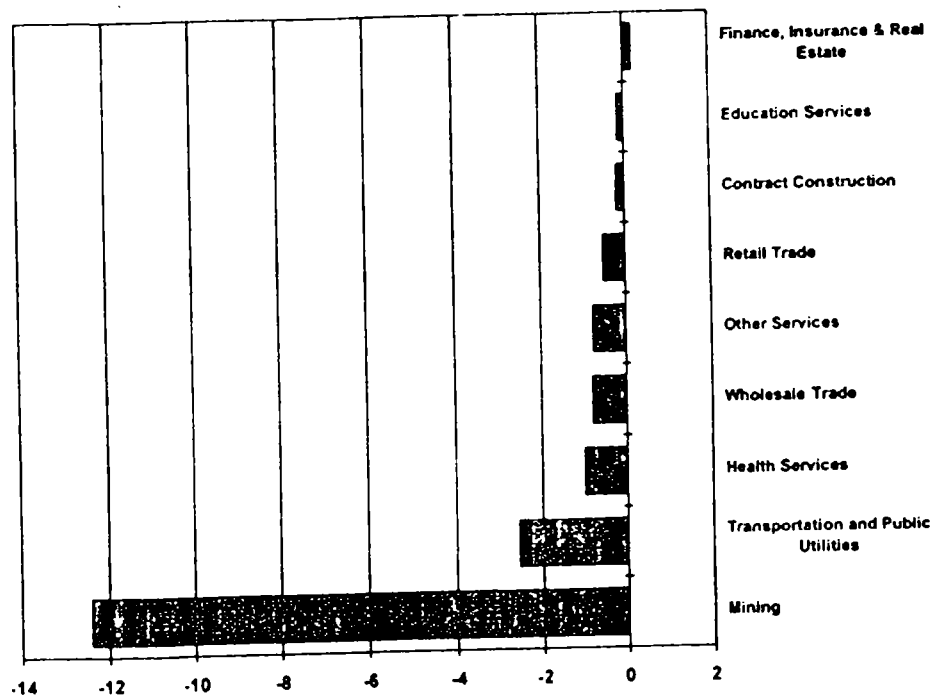


Exhibit 9
Employment Impacts—Manufacturing
Case 2: % Difference from Base Case, 2020

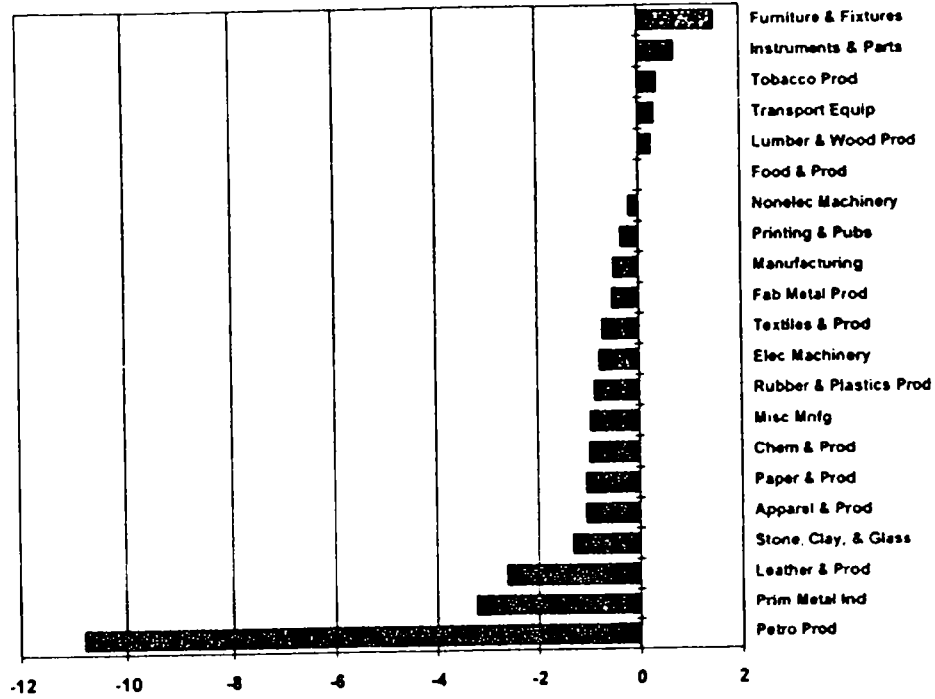
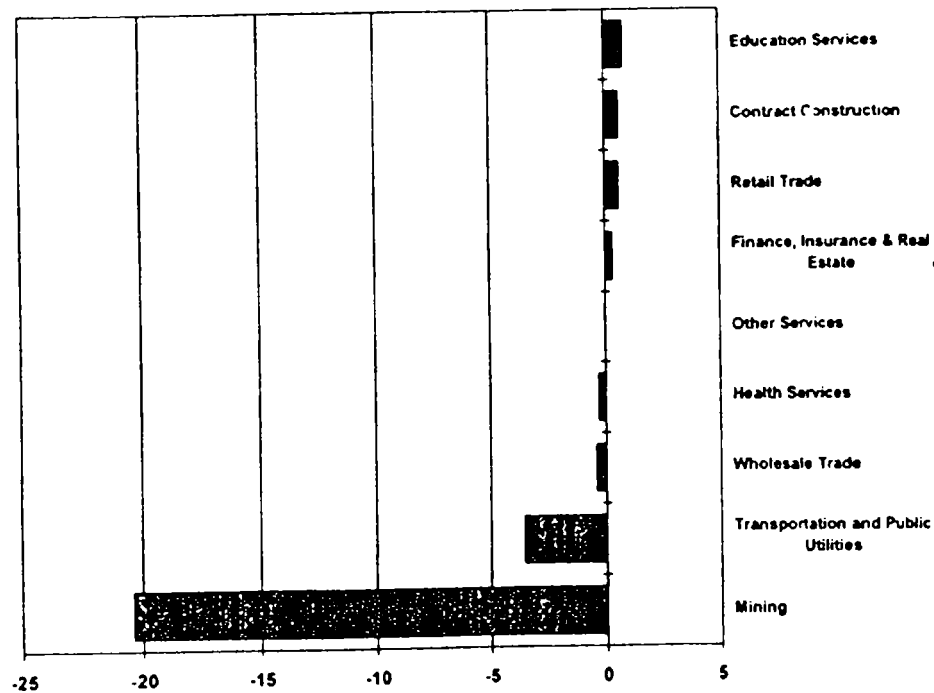


Exhibit 10
Employment Impacts—NonManufacturing
Case 2: % Difference from Base Case, 2020



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Hearing of the Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs

The Kyoto Protocol: Is the Clinton-Gore Administration Selling Out Americans? Part IV

June 24, 1998 10:00 a.m.

2154 Rayburn House Office Building

WITNESS LIST

Panel I

The Honorable Mike Enzi
U.S. Senator, State of Wyoming

Panel II

Cecil Roberts
President, United Mine Workers of America

Chris Farrand
Executive Vice President, Peabody Holding Company

Robert E. Murray
President and Chief Executive Officer
Coal Resources, Inc.
Ohio Valley Resources, Inc.
The American Coal Company

Paul Agathen
Senior Vice President, Ameren Services

Ande Abbott
Assistant to International President
International Brotherhood of Boilermakers

Panel III

The Honorable Ernest Moniz
Under Secretary, Department of Energy

Panel IV

The Honorable Eliza Perry
City Councilwoman
Homestead, Florida

**Statement of Chairman David McIntosh
Subcommittee on National Economic Growth,
Natural Resources, and Regulatory Affairs
on
“Kyoto Protocol: Is the Clinton-Gore Administration
Selling out Americans? -- Part IV”
June 24, 1998**

Today's hearing is another in a series of hearings that the Subcommittee is conducting on the potential impact of the Kyoto Protocol on American citizens, American businesses and labor, the U.S. economy, and U.S. energy markets. At prior hearings, we heard from citizens, elected officials from state and local governments, and economic experts who believe that this treaty, which the Clinton-Gore Administration negotiated in December 1997, could potentially have very serious economic consequences for Americans.

The Kyoto Protocol commits the U.S. to reducing greenhouse gas emissions 7 percent below 1990 levels within the timeframe 2008 to 2012. To meet this target, experts project that we will have to decrease energy use by 40% or more.

Moreover, while the treaty imposes onerous requirements on the U.S. and other industrialized countries, it exempts developing nations from any new commitments, regardless of their economic development or the quantity of greenhouse gases they emit. Huge emissions producers like China, India, South Korea, Brazil, and Mexico are totally excluded.

At our hearing on May 19, 1998, Dr. Janet Yellen, President Clinton's principal White House economic adviser, told my Subcommittee that the costs to Americans of complying with the Kyoto Protocol would be "modest." According to the Administration's calculations, it would only cost one tenth of one percent of projected GDP in 2010, with an emissions price in the range of \$14 to \$23 per ton of carbon. Also, at the household level, the Administration estimates that each household's energy bill would increase only by \$70 to \$110 per year. Of course, she is assuming that the Clinton/Gore Administration will be able to convince other countries, including developing nations, to agree to an unrestricted, global emissions trading system that they now firmly oppose, and that the system will work as efficiently as the New York Stock Exchange.

By contrast, at our April 23, 1998 hearing, WEFA, Inc. economist Dr. Mary Novak testified that the Kyoto target for the U.S. could not be met without significant increases in energy prices. Dr. Novak predicted that the Protocol would result in a loss in GDP of 3.2 percent, or \$300 billion. In addition, the U.S. would lose 2.4 million jobs. Gasoline prices would rise 65 cents per gallon and industrial gas and electricity prices would double. This translates into an increase of about \$2,700 more annually per household for energy and other products.

This hearing will examine what all this will mean for the coal and electric utility industries and workers, if the Clinton/Gore Administration proceeds with the signing of this treaty.

According to Resources Data International (RDI), well over a third of current U.S. coal-fired generation may need to be eliminated to meet the Kyoto target. The utility sector accounts for about 37 percent of total U.S. CO₂ emissions, and coal-fired units account for 82 percent of electricity sector emissions. However, if coal-fired generation is drastically reduced, our nation will not be able to meet projected power demand in 2010. RDI estimates that there will be a 19 percent gap in available electricity generation, "even if wind and solar generation increase by almost 500 percent and natural gas increases by 170 percent from 1997 levels."

In addition, at this time, the only real substitute for coal is natural gas. But replacing more than half of our electricity output with natural gas raises significant questions about price increases and supply. The Department of Energy's Energy Information Administration recently estimated that, in 2010, the cost of natural gas will be about 2.6 times the cost of coal in 2010. Moreover, the present gas pipeline network is not adequate to meet such increased demand.

In short, a massive reduction of coal-fired generation and conversion to natural gas would put the reliability of our nation's electric supply at significant risk. Moreover, because our economic growth is tied to the availability of electricity, this would have a very adverse effect on the U.S. economy at large.

As you will hear today, both business and labor are in complete agreement that the Kyoto Protocol spells "All Pain and No Gain." Despite the enormous price that the U.S. would have to pay in complying, this treaty would accomplish almost nothing environmentally. Therefore, it would be nothing short of reckless for the Clinton/Gore Administration to proceed with the signing of this treaty. Signing this agreement would not only violate Senate Resolution 98, it also would make clear that President Clinton and Vice President Gore are putting their own political agenda ahead of the welfare and interests of the American people, our children, and future generations.

Finally, we have to make sure that the Administration does not jump the gun on Congress and implement the Kyoto Protocol through the back-door. While Under Secretary of State Eizenstat has repeatedly disavowed any intention of the Administration to implement the treaty without it first being ratified, these protests of innocence just don't square with the Administration's actions. Appropriations restrictions have now been proposed in both the House and Senate to put the brakes on such back-door actions. We have to pass these measures and say to Al Gore and Carol Browner, we have a United States Constitution, and we will not allow you to make an end-run around fundamental democratic processes to advance your radical social agenda.



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

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VERIFICATION NUMBER: 202/395-6827
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ENVIRONMENT BRANCH
ROOM 8026
NEW EXECUTIVE OFFICE BLDG.

Name

Fax # 60215

To:

Jonathan Adashek

FINAL

From:

Bob Tuccillo

Message:

Ed DeSive's testimony for McIntosh hearing.
See pages 5-6 for climate change

Number of Pages to Follow: 6

Date:

6/16/98

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6:03 pm

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EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON, D.C. 20503

STATEMENT OF G. EDWARD DESEVE
ACTING DEPUTY DIRECTOR FOR MANAGEMENT
AND
CONTROLLER
OFFICE OF MANAGEMENT AND BUDGET
BEFORE THE
SUBCOMMITTEE ON NATIONAL ECONOMIC GROWTH,
NATURAL RESOURCES, AND REGULATORY AFFAIRS
COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT
U.S. HOUSE OF REPRESENTATIVES

June 17, 1998

Good afternoon, Mr. Chairman and members of this Subcommittee. Your letter of invitation asked me to discuss two topics: (1) implementation of the Congressional Review Act by OMB's Office of Information and Regulatory Affairs (OIRA); and (2) cooperation with the Subcommittee's requests for information regarding the White House Climate Change Initiative, including OMB's review of pending letters of response from specific agencies.

CONGRESSIONAL REVIEW OF AGENCY RULEMAKING

The Congressional Review Act¹ had the strong support of President Clinton. It was signed on March 29, 1996. By passing this law, Congress acknowledged and assumed more responsibility for its continuing role in the regulatory system. For too long, Congress passed laws, taking credit for mandating clean air, or a safe workplace, only to question or even criticize the agency rule that implements the law. With this law, Congress will see what it has authorized, and can speak to any regulatory actions that it thinks are not true to its intent.

I welcome the opportunity to discuss what has happened over the past two years, and to hear the experience of GAO in administering the law.

¹ 5 U.S.C. chapter 8, passed in Title II, Subtitle E, of P.L. 104-121.

- 2 -

1. What does the statute require?

To help focus our discussion, let me first summarize this legislation. In general terms, agencies are to send a copy of each new final rule (and certain analyses that they may undertake related to the rule) to both Houses of Congress (for transmittal to the appropriate authorizing Committees) and to the General Accounting Office (GAO) before the rule can take effect.

When an agency sends a rule to Congress and GAO, the agency is to indicate whether the rule is "major" or not. The statute directs OMB's Office of Information and Regulatory Affairs (OIRA) to find whether a rule meets the statutory definition of "major"-- that is, whether the rule is likely to result in an annual effect on the economy of over \$100,000,000; a major increase in costs or prices; or significant adverse effects on competition, employment, investment, productivity, innovation, or on the ability of United States-based enterprises to compete with foreign-based enterprises.

The designation of a rule as "major" has several consequences. Unless exempted, a major rule may not take effect until 60 calendar days after it has been submitted to Congress. In addition, GAO is to provide a report to the agency's authorizing Committee on each major rule. Whether or not a rule is designated as "major," Congress has 60 legislative days during which it may use expedited procedures to disapprove the rule.

I want to stress that there are two distinct time periods in the statute -- (1) the delay in effective date for "major" rules, and (2) the Congressional review period, during which the expedited review procedures are available:

(1) Effective Date. "Major" rules can only take effect, with certain exceptions, 60 calendar days after submission to Congress and GAO. "Non-major" rules take effect as they normally do after submission. All of the rules that were submitted to Congress under this Act year went into effect according to these effective date provisions.

- 3 -

(2) Congressional Review Period. If, within a prescribed time period, a Member introduces a joint resolution of disapproval, then that joint resolution is subject to certain expedited procedures for consideration in Congress. All rules (both major and non-major) are subject to this Congressional review for 60 legislative days, which, depending on when Congress is or is not in session, is a time period that can extend to over one-and-a-half years. During the past two years, all the rules issued by the agencies went into effect before the expiration of the Congressional review period.

2. What did OIRA do when the statute took effect?

The Congressional Review Act took effect immediately on the day the statute was signed into law -- on Friday, March 29, 1996. Most agency staff knew little about it. To help them prepare quickly, OIRA moved quickly. On Tuesday, April 2, 1996, the OIRA Administrator, Sally Katzen, sent an OMB memorandum (M-96-19) to the heads of all agencies outlining the provisions of the new legislation and discussing the definition of "major." Based on advice OMB staff received from Congressional staff, Ms. Katzen included the address of the House Clerk and the Secretary of the Senate as the place to which agencies should send their final rules.

Two weeks later, after agencies had begun to send their final rules to these officials, she received telephone calls asking that final rules go to the Speaker of the House and the President of the Senate, and that they be transmitted with a cover letter providing certain information. On April 19, 1996, she sent another memo to the heads of Federal agencies, providing these new addresses and the content suggested for the cover letter.

Meanwhile, as Chair of the Regulatory Working Group established under Executive Order No. 12866, the OIRA Administrator stressed to agency Regulatory Policy Officers the importance of moving quickly to implement this new law. During this time, OIRA staff were receiving a variety of questions from agency staff about what they should do under the new statute. OIRA then prepared a document entitled "Frequently Asked Questions," which was

- 4 -

distributed to OIRA staff to answer these questions and to share with agency staff if they so desired. I have attached a copy of each of these memoranda at the end of this written statement.

In addition, because OIRA does not review the regulations issued by the independent regulatory agencies under Executive Order 12866, OIRA had to design a process to determine whether the final rule of an independent regulatory agency is "major" within the meaning of the statute. Therefore, OIRA invited regulatory contacts from the independent regulatory agencies (those not subject to Executive Order 12866 review) to a meeting on April 12, 1996, to discuss OIRA's April 2 memorandum and how they could best coordinate regarding OIRA's determination of "major." After this meeting, the independent regulatory agencies began sending OIRA summaries of their upcoming final regulations to allow OIRA to decide whether or not these rules were "major." Initially, there was a flurry of staff discussions. This process for the "independents" has now become routine.

For those agencies whose regulations are subject to review under Executive Order 12866, the OIRA Administrator asked OIRA staff to ensure that the agencies understood which rules were "major." The term, as defined in the statute, is similar, but not identical, to the category covered under section 3(1)(1) of Executive Order 12866 for "economically significant" rules. The statutory definition of "major" was taken from a predecessor Order, Executive Order 12291 (signed February 17, 1981, and revoked September 30, 1993). Accordingly, OIRA staff were told to use the same interpretation that they had relied on when carrying out their regulatory reviews under Executive Order 12291.

It is now routine for OIRA to implement the CRA as it reviews rules under Executive Order 12866. OIRA staff determine whether or not the draft rules should be considered "major" in the course of their reviews. They also review the various analyses agencies perform to determine whether they meet the appropriate standards.

- 5 -

3. *Where are we now?*

In their testimony, GAO informs us that it has received 131 major rules and 9,052 non-major final rules -- an average of roughly 80 rules a week. Overall, this indicates that the agencies are making serious efforts to comply with the statute and that the authorizing Committees are receiving a lot of rules.

However, agency compliance has not been 100% complete. In November 1997, GAO prepared a list that pointed out that agencies had not submitted 279 final rules on a timely basis. Recently, GAO prepared another list indicating that 66 final rules had not been submitted on a timely basis. We are pleased that the agencies are doing so well (97% compliance for the first check), that the rate of compliance is increasing (over 99% compliance for the second check), and that GAO and OIRA are working together so well in helping this to happen.

We also know that compliance with the CRA is not cost free. It takes effort and resources for agencies to transmit the rules to Congress, for Congressional staff to process the agency submissions, for the authorizing Committees to review them, and for GAO to keep track of all the submissions and prepare reports for major rules. We hope that the authorizing Committees find this information useful and helpful.

REQUESTING INFORMATION ABOUT THE CLIMATE CHANGE INITIATIVE

Regarding your questions about our cooperation with the Subcommittee's requests for information regarding the White House Climate Change Initiative -- we worked diligently to prepare written answers to the questions you raised in the March 2 and March 6, 1998, letters sent jointly to OMB and the Council on Environmental Quality (CEQ). You were sent responses on May 13 and June 9. You have the responses to both letters and the accompanying documents collected through a search of the files of both agencies. The time it took us to respond was dictated by the length and complexity of the questions you posed.

- 6 -

With respect to the process for review of agency responses to the Subcommittee's request for information, we followed the normal interagency review process coordinated by OMB and used for congressional reports, testimony, or follow up questions from congressional hearings. The amount of time involved in reviewing an agencies response was, in part, determined by the number of responses in the review process at any one time. Obviously, reviewing a number of agency responses involving 80 to 100 questions and answers submitted for review at the same time slowed down the process considerably.

* * * * *

I appreciate the opportunity to testify, and welcome any questions that you may have.

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**6/4/98 SENATE COMMITTEE
ON ENERGY & NAT.
RESOURCES**

Divider Title: _____

**Statement of Dirk Forrister
Chairman, White House Climate Change Task Force
Before the
Committee on Energy and Natural Resources
United States Senate**

June 4, 1998

Mr. Chairman and Members of the Subcommittee, I am pleased to be here today to describe the Administration's efforts to address the important issue of global climate change. In our view, climate change is one of the great environmental challenges of the next century. Rarely has there been a greater need for the Executive Branch and the Congress to work closely together to heed the clear warning of the world's leading scientists that we must begin now to address the threat of global warming.

Last October, President Clinton proposed a strong and sensible plan that is aimed at improving our energy efficiency, spurring the development of renewable energy sources, enhancing America's leadership in energy technology, improving air quality and reducing greenhouse gases. In my testimony today, I will outline this plan in more detail.

But first, I think it worthwhile to take a moment to review the basic reason why we are here today discussing this issue. Why do we care about global warming? The answer is that we have no alternative. We care about climate change because our best scientists tell us it is a real problem. We care because our best scientists tell us that the threats climate change poses are too serious to ignore. It is our responsibility to take vigorous, sensible steps to solve this problem. If we fail to do so, it is our children and grandchildren who will pay the price.

The Science of Climate Change

Scientists know that greenhouse gases in nature keep the Earth's temperature an estimated 60 degrees Fahrenheit warmer than it would be absent such gases, thus sustaining our existence on the planet.

As a result of human activities, the concentration of carbon dioxide (the principal greenhouse gas) has increased 30 percent since preindustrial times. If we continue on a business-as-usual trajectory, concentrations of carbon dioxide could double by 2100 -- levels not seen on the planet for 50 million years. Climate models project a temperature increase of 2 to 6.5 degrees Fahrenheit by 2100. By way of reference, a cooling in average temperatures of 9 degrees Fahrenheit brought on the last ice age.

There is substantial evidence that global warming is well under way. Studies have shown that the 20th century has been the warmest century in 600 years. The 1990s have been the warmest decade in that period and 1997 was the single warmest year on record.

Potential Impacts of Climate Change

The impacts of this warming pose serious threats to public health and the environment. Warmer temperatures are projected to increase fatalities from heat stress of the kind that killed 400 people in Chicago in 1995 and expand the geographic ranges for diseases like malaria and dengue fever. The incidence of asthma and other respiratory illnesses, particularly among children and the elderly, is expected to increase from the additional smog caused by warmer temperatures.

Warmer, wetter weather is projected to increase the frequency and intensity of extreme and costly events such as floods and drought. The 1993 Mississippi River flood alone caused

damages of between ten and twenty billion dollars. The Pacific Northwest floods of 1996 and 1997 and the 1997 Ohio River and Red River floods resulted in substantial costs to business and homeowners.

Scientists project that sea levels will rise by an additional six to thirty-eight inches by the year 2100. A 20-inch sea level rise could inundate 7,000 square miles of the U.S. coastline. Low lying areas, such as Florida and the Gulf Coast, are at the greatest risk with potential devastating effects on local agriculture, quality of life and drinking water supplies.

Furthermore, changes in growing seasons, water availability, soil moisture and precipitation could cause significant regional shifts in food productivity, with decreases in food production in many of the world's poorest regions.

Some have argued that we can wait to act until all the details of the climate system have been fully understood. This is a recipe for disaster. We will only fully confirm predictions when we experience them. At that point it will be too late. The concentrations of greenhouse gases in the atmosphere continue to rise each year, and because these gases persist for many decades to centuries, this problem is only slowly reversed. The earth will continue to warm and the seas continue to rise as long as we continue to load the atmosphere of the earth with greenhouse gases.

Kyoto Protocol

The Clinton Administration is working hard at home and with our partners abroad to address climate change. The Kyoto Protocol, negotiated last December, is an historic step toward building an effective international response to the problem of climate change. The essential elements of the Kyoto Protocol include binding emissions targets for industrialized nations to be

reached over a five-year period, from 2008 to 2012. The Protocol includes key market mechanisms -- like international emissions trading and the new Clean Development Mechanism -- that will provide companies with real flexibility in how they achieve emissions reductions. The Clean Development Mechanism establishes the right for companies to secure low-cost emissions credits by participating with developing countries in specific projects to reduce their emissions.

The Administration's focus going forward will be on securing meaningful participation from key developing countries and on establishing rules and guidelines for putting agreed market mechanisms into practice. The President has made it clear that the treaty will not be sent to the Senate for its consideration until this goal has been achieved. We have initiated extensive bilateral and multilateral discussions aimed at encouraging progress in this area. We are also engaged in ongoing discussions related to the implementation of international trading and the Clean Development Mechanism, as well as provisions on activities, such as forestry, that absorb carbon. All of these issues are likely to be the subject of discussions at this year's negotiating sessions.

The President's Domestic Plan

Turning to our efforts at home, President Clinton's plan for reducing greenhouse gas emissions emphasizes win-win initiatives designed to cut emissions by increasing energy efficiency; by developing new, cleaner energy technologies; by working with industry and others to promote sensible solutions; and by relying on market-based mechanisms to ensure cost-effective reductions. I would like to briefly outline the key elements of this plan.

The President's FY 1999 budget includes a program of tax incentives and research and development investments to help us meet the challenge of climate change while increasing our

nation's economic competitiveness and protecting our environment. The program totals 6.3 billion dollars over 5 years -- 3.6 billion dollars in proposed tax cuts and 2.7 billion dollars in new investments.

The tax incentive package includes tax credits such as up to 4,000 dollars for consumers who purchase highly efficient vehicles and up to 2,000 dollars for energy-efficient new homes. A 15 percent tax credit (up to 2,000 dollars) for rooftop solar equipment and a 20 percent tax credit (subject to a cap) for energy-efficient building equipment for homes and offices. A 10 percent tax credit for investment in combined heat and power systems. And, finally, an extension of a current tax credit of 1.5 cents per kilowatt hour for the production of electricity from wind and biomass.

The investment package includes research and development spending in the major carbon-emitting sectors of the economy -- buildings, transportation, and industry. These investment proposals build on a solid track record of government-industry partnership. For example, among projects to be expanded is the Partnership for a New Generation of Vehicles, a government-industry effort to develop highly-efficient cars. We will also build on our solid foundation of advanced and basic research by investing substantial funds in research partnerships for key renewable energy technologies.

A second component of the President's plan involves building partnerships with key energy-intensive industries to develop sector-by-sector initiatives to cut emissions. These partnerships will identify opportunities for working together to remove barriers to the development and widespread use of energy efficient technologies and practices. As part of these consultations, the Administration will discuss ways to ensure credit for businesses that act early.

On May 4, President Clinton announced one important new partnership -- the Partnership

for Advancing Technology in Housing (PATH). This partnership with the homebuilding sector is designed to build new homes that are 50 percent more energy efficient within a decade and to retrofit at least 15 million existing homes within a decade to make them 30 percent more energy efficient. Meeting PATH goals would save consumers 11 billion dollars a year in energy costs by 2010 and reduce annual carbon emissions in 2010 by nearly 24 million tons -- the amount produced by some 20 million cars.

In another recent government-industry development, the Environmental Protection Agency and the Department of Energy extended their joint Energy Star program to commercial buildings that achieve a 30 percent reduction in energy use. The Energy Star program allows manufacturers of selected energy efficient products to promote their products with an "Energy Star" label. Among the major buildings that have already signed up for the Energy Star building program are the Empire State Building, World Trade Center, and Chicago's Sears Tower.

My own work with the White House Climate Change Task Force has been particularly focussed on these industry consultations during the past several months. We have held preliminary meetings with a number of key energy intensive industries and we are hopeful that these ongoing discussions will lead to a fruitful collaboration, with industry providing their best ideas on ways they can improve their energy use and thereby reduce their emissions, and the government providing useful assistance to spur industry efforts.

A third element of the President's plan is to substantially reduce the Federal government's own greenhouse gas emissions by improving the energy efficiency of Federal facilities and activities and by reforming procurement practices. These actions would be important in their own right, since the Federal government is the nation's largest single energy

user, but they can also set an important example for the private sector.

Another core element of the President's plan involves restructuring the electricity industry in such a way as to reduce greenhouse gas emissions while saving consumers millions on their energy bills. The Administration's restructuring proposal includes a renewable portfolio standard to increase the use of electricity from renewable sources, a 6 billion dollar a year Public Benefits Fund to spur greater investment in energy efficiency and renewable resources, and a labeling requirement so that consumers will have information about the source of electricity being used when selecting their supplier.

The President has also proposed a domestic emissions trading system to begin by 2008, after a decade of experience in reducing emissions. The goal of such a regime is to ensure that further cuts are achieved as cost-effectively as possible. The United States has used emissions trading successfully to reduce the pollution that causes acid rain -- exceeding environmental objectives at costs far lower than anticipated.

Finally, the Administration is continuing its strong support for the U.S. Global Change Research Program. This program is focused on increasing our knowledge of the timing and regional patterns of the climate changes we expect, the combined effects of natural variation and human actions, and the vulnerability of natural resources. A strong foundation of peer-reviewed science results will support sound policy making and the evaluation of actions taken to confront the challenge of climate change.

Conclusion

Taken together these domestic actions chart a course aimed at enhancing our nation's energy efficiency and spurring technological innovation in ways that will reduce greenhouse gas emissions. We look forward to continuing to work with this committee and the rest of Congress as we move forward in meeting the important challenge of responding to the risks of global climate change.

I would be happy to answer any questions the Committee may have.

Statement of Dan Reicher
Assistant Secretary for Energy Efficiency and Renewable Energy
U.S. Department of Energy
Before the
Committee on Energy and Natural Resources
U.S. Senate

June 4, 1998

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to appear before you to discuss how the Department of Energy's enhanced energy research and development initiative can help the nation reduce our dependence on foreign oil, increase our nation's competitiveness, cut air pollution, help maintain our leadership in energy technology, and at the same time, address climate change. I will also discuss management issues and in particular the set of strategic goals, metrics and performance measures developed for this initiative.

As the 21st century approaches, our nation faces many energy, economic, and environmental challenges. Over the next few years, we will confront the threat of global climate change; restructure U.S. electricity markets; implement new federal and state clean air requirements; encounter a volatile global energy market; and face increased economic competition in the global market for clean energy technologies. There is a technology path that can help meet these challenges and turn them into opportunities.

Research, development and accelerated use of energy efficiency and clean energy technologies, built upon a solid foundation of advanced science and basic research, are major parts of the solution. In fact, this technology path is so important in meeting these challenges, that even without the threat of climate change, these investments would still be wise national policy. This exact point was made last Fall by the President's Committee of Advisors on Science and Technology.

There is no "silver bullet" that will address all our future energy needs. A broad and balanced R&D portfolio -- one that builds on clean fossil, renewable and nuclear supplies and increased efficiency of energy use -- is essential. We must make better use of conventional energy sources through energy efficiency while also investing in new energy supply technologies. A robust energy portfolio will provide many benefits, including reduced energy costs, increased energy security, improved air quality, greater U.S. competitiveness, and reduced greenhouse gas emissions.

That is why we are asking for funding for the following:

- Hydropower R&D to develop a fish friendly turbine that will help us preserve our large installed hydropower base that currently provides approximately 10% of U.S. electricity;
- Technologies that improve the efficiency and extend the operating life of current nuclear

- power plants;
- Super clean diesel engines that will be one-third more efficient than comparable gasoline engines and meet equivalent emission standards;
- Advanced gas turbines that can provide industrial and commercial buildings not only with their electricity, but with their heat, at system efficiencies of 70 percent and higher;
- R&D partnerships with U.S. energy-intensive industries -- like steel, chemicals, and forest products -- to develop technologies to save energy and increase industrial productivity;
- R&D collaboration with the agriculture industry to use crops like corn and soybeans -- instead of oil -- to make everyday consumer items -- ranging from paints and plastics to carpets and car parts; and,
- Sequestration technologies to keep the carbon dioxide from coal combustion out of the atmosphere.

These investment proposals are built on a solid track record of DOE success in advancing energy technology.

In January, Chrysler, Ford, and GM stunned the world with their announcement of concept vehicles that promise two to three times greater fuel efficiency. This followed a DOE, Chrysler and A.D. Little announcement of a major breakthrough in powering a fuel cell electric car with gasoline.

In April we dedicated an advanced clean coal power plant in Nevada that produces 20 percent fewer greenhouse gas emissions and 90 percent less sulfur and nitrogen oxide emissions. The advances in this plant result in part from our Fossil Energy R&D efforts.

Also in April, Mayor Giuliani and Secretary Peña celebrated a new state-of-the-art office tower in Manhattan -- a building already fully rented, powered in part by fuel cells and photovoltaic panels, and expected to be 40 percent more energy efficient than the average building its size, with a similar reduction in associated greenhouse gas emissions. The technologies used in this building were developed by DOE in partnership with industry and the national laboratories.

A month ago, Bethlehem Steel and DOE showcased in Indiana an array of technologies that will significantly cut pollution and energy use in the largest integrated steel mill in the nation -- a mill that spends about \$300,000 per day on energy -- or more than \$100 million per year.

And in the past year, DOE has pioneered a simple method for leveraging billions of private sector dollars for energy retrofits for the nation's Federal buildings. The Federal government occupies 500,000 structures and is the single largest energy user in America. In one recent example, New York's Consolidated Edison is investing \$6 million of its own money to retrofit a V.A. hospital that will save the V.A. and taxpayers \$1 million a year.

Clearly, the common ground in the climate change debate is technology. From Mobil Oil to the Sierra Club, 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. Last year, 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. In April, the directors of eleven national laboratories issued a study that outlined almost 50 separate technology pathways for reducing greenhouse gas emissions over the next 30 years while providing other benefits such as cost savings, increased energy security and improved local environmental quality.

Technology is also key to ensuring the meaningful participation of developing nations in any 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 Kyoto "back-doors" and economic models, then the U.S. economy, our citizens, and the global environment will be the real losers.

Let me turn now to management issues for this initiative. The GAO has questioned whether this initiative has effective goals, quantitative metrics and program performance measures that will ensure effective management and execution of these programs. I want to assure the committee that this initiative has been extensively planned and has in place management mechanisms that ensure a large return to the American people. I can confidently state this for two reasons.

First, virtually all of the CCTI within DOE are expansions of existing programs. In developing this initiative, an interagency team identified ongoing programs that were "the best of the best" -- that is, those that had the greatest potential to significantly reduce greenhouse gas emissions while meeting our other national energy and environmental goals. Such programs include the Partnership for a New Generation of Vehicles, Industries of the Future and renewable energy technologies. These programs have a history of effective technical and market successes.

Second, we have established over the last five years a comprehensive system of strategic goals, quantitative metrics and detailed performance measures for these programs. We have done so to improve our internal management and ensure even more effective stewardship of taxpayer money and to respond to Government Performance and Results Act. The major energy DOE programs within the CCTI -- renewable energy, transportation efficiency, industrial efficiency, buildings efficiency, federal energy management, fossil energy, nuclear energy and energy research -- each 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. The strategic goals, quantitative metrics and program performance measures form a hierarchy of information that enables the Department not only to effectively manage our ongoing efforts, but to manage the proposed increases as well.

At the highest level of this information hierarchy, our **strategic goals** describe how the DOE efforts will address our national energy and environmental challenges. These goals are from the Department's strategic plan and the 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 -- all of which are externally peer reviewed. At the next level in 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. The final level of this hierarchy is a set of literally hundreds of year-by-year **program performance measures** for specific programs (e.g., solar photovoltaics, advanced automotive technologies, aluminum industry R&D, advanced lighting, advanced fossil power generation) that enable the Department to measure progress and make management decisions that ensure overall success of our efforts. These specific program performance measures are, in effect, intermediate goals that, when completed, enable the strategic goals and quantitative metrics to be achieved. These program performance measures are the foundation of the annual Performance Agreement between the Secretary of Energy and the President. This hierarchy of information is central to each of our programs.

For example, in transportation, our primary **strategic goal** is to develop, by 2004, mid-sized cars capable of 80 miles per gallon and two-third reductions in emissions, with no compromises in safety, comfort, performance or cost -- through the Partnership for a New Generation of Vehicles (PNGV). We estimate that achieving this and our other transportation goals will reduce 2010 U.S. oil consumption by 1.3 to 2.4 million barrels per day and cut carbon emissions by 18-27 million metric tons (MMT). These estimates are our **quantitative metrics**. Combined with policies to accelerate the market use of these vehicles, the potential carbon reductions in 2010 are even higher -- 45 to 50 MMT. A small sample of the dozens of year-by-year PNGV **program performance measures** includes: validation, by dynamometer testing and vehicle simulation, advanced piston engine technology that meet the requirements for an 80 mpg low emissions vehicle (1999); complete development of a full-scale regenerative particulate trap and non-thermal plasma device for NOx and PM emissions reduction from the high efficiency diesel engine (2001); and completing the manufacturing prototype 80 mpg auto in 2004.

In our industrial technologies program, our primary **strategic goal** is to improve, by 2010, the efficiency per unit output of the nation's most energy intensive industries and cut energy-related emissions and waste by 25 percent relative to projections through the Industries of the Future partnerships with the major energy-intensive U.S. industries. We estimate that achieving this and our other industrial goals will reduce 2010 U.S. energy consumption by 900 to 1,500 trillion Btus, save \$3-5 billion in annual energy costs and cut carbon emissions by 16-31 million metric tons (MMT). These estimates are our **quantitative metrics**. Combined with policies to accelerate the market use of these vehicles, the potential carbon reductions across industry in 2010 are even higher -- 50-60 MMT. One of the Industries of the Future partnerships works with the Aluminum industry to develop technologies to increase the efficiency of aluminum production. A sample of the year-by-year aluminum industry R&D **program performance measures** includes: full-scale testing of wettable cathode technology for aluminum production (2001); complete design of full-size production cell for use with inert anode technology (2002); and full-scale testing of inert

anode technology for 25% electricity savings (2004).

A final example is federal energy management. Our **strategic goal** is to improve, by 2005, the energy efficiency in Federal buildings by 30 percent over 1985 levels. We are roughly halfway to reaching this goal using innovative mechanisms to spur private sector investment in efficiency in federal facilities. To meet this goal, DOE has developed broad, streamlined Super Energy Savings Performance Contracts (ESPCs) that provide a way for the private sector to invest its capital in energy efficiency in federal facilities and make a profit through a share in the savings in energy bills. The ESPCs will attract up to \$5 billion in private capital investments and cause a revolution in energy efficiency investments in the federal government. The **quantitative metrics** are energy savings of 100 trillion Btus per year in 2005 and 200 trillion Btus in 2010 - saving taxpayers \$900 million per year in 2005 and \$1.4 billion per year by 2010 and reducing carbon emissions by 3-4 MMTs. **Program performance measures** include: complete regional ESPCs (1998); obtain \$450 million in annual energy efficiency task orders (annual); and train a total of 15,000 federal facilities managers on use of ESPCs (by 2004).

In the last five years, the Department of Energy has made great strides in strategic planning and performance-based management. While this system is still being improved, the progress we have made enable me to state confidently that the proposed budget increases, if approved by the appropriations committees, will meet the goals we have set and provide the national benefits that we have estimated.

Thank you again, Mr. Chairman, and members of the Subcommittee for the opportunity to testify before you today.

For Release Upon Delivery
Expected at 9:30 a.m.
June 4, 1998

STATEMENT OF JOHN KARL SCHOLZ
DEPUTY ASSISTANT SECRETARY (TAX ANALYSIS)
DEPARTMENT OF THE TREASURY
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to discuss with you today the Administration's climate change tax incentives.

As you know, a few months ago, in the Administration's budget for FY 1999, the President presented to the Congress his plan to begin addressing climate change. That plan includes \$3.6 billion of tax incentives that will encourage energy efficiency and renewable energy sources. The proposed tax incentives are part of a larger package of technology initiatives. In addition to the \$3.6 billion of tax incentives, the Administration proposed \$2.7 billion for R&D and deployment of energy efficiency, renewable energy, and carbon-reducing technologies. These provide a total of \$6.3 billion in new funding and tax incentives over five years. We believe that these initiatives will stimulate the development and use of technologies that can help to improve energy efficiency and reduce greenhouse gas emissions.

My comments today will focus on an explanation of the Administration's proposed tax incentives.

DISCUSSION

Individuals and businesses underinvest in energy-saving technologies because the private returns from those investments are lower than the benefits to society. Private incentives may be too low because the market prices that serve as the signals that influence investment decisions do not take into account the benefits to society attributable to energy savings. Investments in energy-saving technologies can reduce dependence on oil imports and slow the buildup of greenhouse gases in the atmosphere. Tax incentives are an appropriate method for addressing the failure of market prices to achieve the desirable level of investment in energy-saving technologies because they can increase the private return from the investment by reducing its cost.

The proposed tax incentives are intended to reduce energy consumption and greenhouse gas emissions by encouraging the deployment of technologies that are highly energy efficient and that use renewable energy sources. Tax incentives can only be claimed for items that meet high standards for energy efficiency, use renewable energy sources, or reduce emissions of certain highly potent greenhouse gases. If the incentives are successful and are claimed by taxpayers, there will be energy savings and reductions in greenhouse gas emissions. If taxpayers do not take advantage of the incentives, however, there will be no revenue loss.

Specifically, we designed the incentives to take into account the following considerations:

(1) **Superior energy efficiency compared to conventional equipment.** The eligible items must meet high standards for energy efficiency or use renewable energy sources. This helps to ensure that scarce public resources are being used for the intended goal of reducing greenhouse gases.

(2) **High threshold for eligibility.** The eligible items must presently account for a small share of the market. This minimizes windfalls for purchases that would have been made anyway.

(3) **High up-front costs compared to conventional equipment.** The targeted technologies have significantly higher purchase prices than conventional equipment and, at current market prices, are not universally cost-effective. These high up-front costs are another reason not many would be purchased without the credit.

(4) **Commercially available.** The items must be commercially available or near commercialization. This ensures that the incentives encourage the deployment of new technologies that private markets have already developed.

(5) **Ease of administration.** The items must be able to be defined precisely enough so that the Internal Revenue Service can administer the incentives. This helps to ensure that incentives are claimed only for items for which they are intended.

We also targeted tax incentives to address certain emissions of highly potent greenhouse gases that in some cases have atmospheric lifetimes of thousands of years and a global warming potential as much as several thousand times greater than carbon dioxide, the most abundant greenhouse gas.

The tax incentives the Administration has proposed cover the four major greenhouse gas-emitting sectors of the economy: buildings, industry, transportation, and electricity.

Buildings

Buildings currently account for about one-third of energy consumption and the related greenhouse gas emissions. The proposed tax incentives for the buildings sector would encourage

investment in a new generation of energy-efficient building equipment, highly energy-efficient new homes, and rooftop solar systems.

Tax credit for highly energy-efficient building equipment

A 20 percent tax credit would be provided for the purchase of certain highly energy-efficient building equipment. This credit encourages the purchase of equipment that will improve the energy efficiency of both residential and commercial buildings. The items covered are certain fuel cells, electric heat pump water heaters, natural gas water heaters, electric heat pumps, natural gas heat pumps, and advanced central air conditioners. Only very energy efficient equipment of each type would be eligible. The credit would be temporary -- for equipment purchased between January 1, 1999 and December 31, 2003 (fuel cells would be delayed one year). The revenue cost of this incentive is estimated to be \$1.4 billion for FY 1999 - 2003.

The proposed tax credits reflect the considerations noted above. Eligible items embody new, cutting edge technologies, generally capturing less than 1 percent of market sales. Therefore, few of the credits would go for purchases that would have been made anyway. These top-tier technologies have substantial purchase prices and are not universally cost-effective, but offer superior energy efficiency compared to conventional equipment. For example, compared to typical units on the market, the eligible advanced air conditioning systems and electric heat pumps are 40 percent more efficient, and eligible electric heat pump water heaters and natural gas heat pumps are about twice as efficient. Eligible items are currently available. Energy efficiency standards are available for the eligible equipment so that items could be defined precisely enough for IRS to administer the credit.

Through 2008, we estimate that over 7 million taxpayers will purchase energy efficient equipment eligible for the credit. As noted above, eligible units are substantially more energy efficient than the typical units on the market.

Tax credit for new energy-efficient homes

Residences account for about one-sixth of US greenhouse gases and offer one of the largest sources of energy saving potential. Almost one million new homes and manufactured homes are built and sold each year. Some states and certain Federal programs require new houses to meet Model Energy Code standards for insulation and related construction standards, and for heating, cooling and hot water equipment. But the energy efficiency of new homes could be improved by 50 percent or more through the use of energy efficient building practices and more efficient heating and cooling equipment.

To encourage the purchase of new highly energy-efficient homes, a tax credit would be provided equal to one percent of the purchase price (up to a maximum credit of \$2,000) of new homes that use at least 50 percent less energy for heating, cooling and hot water than the Model Energy Code. The full credit would be available for homes purchased between January 1, 1999

and December 31, 2003, and would phase out in 2006. The revenue cost of this incentive is estimated to be \$0.2 billion for FY 1999 - 2003.

Again, we have set a high threshold for eligibility for the credit. Eligible houses would be very energy efficient compared to present standards. Energy used in housing eligible for the credit would be reduced by 75 percent to 85 percent compared to existing housing and by over 50 percent compared to new housing.

Tax credit for rooftop solar systems

Solar energy systems, which accounted for .02 percent of electricity generation in 1996, have the potential to reduce greenhouse gas emissions and energy costs for businesses and individuals. The tax credit for the purchase of rooftop photovoltaic (PV) systems and solar water heating systems solar systems would make these systems more affordable and encourage their purchase. The credit would be 15 percent of qualified investment up to a maximum credit of \$2,000 for PV systems and \$1,000 for solar water heating systems. The credit would be available from January 1, 1999 to December 31, 2003 for solar water heating systems, and to December 31, 2005 for rooftop PV systems. The revenue cost of this incentive is estimated to be \$0.1 billion for FY 1999 - 2003.

This tax initiative will help to achieve the President's goal of one million solar roofs by 2010. Heat and electricity produced from solar energy systems produce no greenhouse gases.

Industry

The proposed tax incentives for industry would promote energy efficiency by encouraging investments in combined heat and power systems that make effective use of energy that is otherwise wasted in producing electricity by more conventional methods. Tax credits are also provided to encourage the replacement of certain electricity circuit breakers that are prone to leak a potent greenhouse gas and the purchase of equipment that recycles certain greenhouse gases used in the semiconductor industry.

Tax credit for combined heat and power (CHP) systems

CHP systems use thermal energy that is otherwise wasted in producing electricity by more conventional methods. These systems increase energy efficiency, lower the consumption of primary fossil fuels and reduce carbon emissions as compared with conventional methods.

To encourage and accelerate investment in CHP equipment, a 10 percent tax credit would be provided for investments in CHP systems that meet certain energy efficiency requirements. A qualified system would be required to produce at least 20 percent of its total useful energy in the form of both thermal energy and electric or mechanical power, and would have to meet certain efficiency standards. The credit would apply to property placed in service between January 1,

1999 and December 31, 2003. The revenue cost of this incentive is estimated to be \$0.9 billion for FY 1999 - 2003.

Current cogeneration capacity is nearly 45 gigawatts. The credit should increase that capacity by about ten percent. Eligible CHP systems should reduce input energy requirements by about one-third compared to conventional systems. This saving is achieved by capturing the current waste heat that is created during the generation of electrical energy and using that waste heat in a thermal application. This saves fuel costs and generates fewer greenhouse gas emissions.

Tax credit for replacement of certain circuit breaker equipment

Certain older, large power circuit breakers used in the transmission and distribution of electric power are particularly prone to leak sulfur hexafluoride (SF₆). This equipment, using a dual pressure technology that was no longer produced after 1985, is particularly prone to leak as the seals corrode over time. The purpose of the tax incentive is to encourage utilities to replace the old equipment with new equipment. To prevent the old equipment from being sold to another utility in the US or abroad, the old equipment must be certified by an appropriate third party to have been destroyed.

To encourage the replacement of leaky circuit breakers, a 10 percent credit would be provided for the cost of new equipment. The credit would apply to new equipment placed in service between January 1, 1999 and December 31, 2003. The revenue cost of this incentive is estimated to be less than \$50 million for FY 1999 - 2003.

Tax credit for perfluorocompound (PFC) and hydrofluorocarbon (HFC) recycling equipment

PFCs and HFCs are among the most potent greenhouse gases because of their extreme stability in the atmosphere and strong absorption of radiation. Because of the rapid anticipated growth of the semiconductor industry, the use of these gases is expected to grow at rates of 20 to 30 percent per year for the next ten years. A 10 percent tax credit would be provided for the purchase of equipment to recycle and recover PFCs and HFCs used in the production of semiconductors. The credit would apply to equipment placed in service between January 1, 1999 and December 31, 2003. The revenue cost of this incentive is estimated to be less than \$50 million for FY 1999 - 2003.

These two tax credits are targeted toward emissions of very potent greenhouse gases that in some cases have atmospheric lifetimes of thousands of years and a global warming potential as much as several thousand times greater than carbon dioxide.

Transportation

The proposed tax initiatives in the transportation sector include tax credits for the purchase of highly fuel-efficient cars and light trucks, and an incentive to encourage public transportation and vanpools.

Tax credits for highly fuel efficient vehicles

Cars and light trucks (including minivans, sport utilities, and pickups) currently account for 20 percent of greenhouse gas emissions. Tax credits for highly fuel efficient vehicles will help to move vehicles that are ultra efficient from the laboratory to the highway. Thus this credit complements the research Partnership for a New Generation of Vehicles (PNGV program) that will develop a production prototype of a family car with three times the fuel economy of today's comparable car (about 80 miles per gallon) by 2003-2004.

Two tax credits would be provided:

- A \$4,000 credit for a vehicle with triple the base fuel economy for its class. This credit would be available for purchases of qualifying vehicles beginning January 1, 2003. The credit amount would be phased down to \$3,000 in 2007, \$2,000 in 2008, and \$1,000 in 2009, and would be phased out in 2010.
- A \$3,000 credit for a vehicle with twice the base fuel economy for its class. The \$3,000 credit would be available for purchases of qualifying vehicles beginning January 1, 2000. The credit amount would be phased down to \$2,000 in 2004, \$1,000 in 2005, and would be phased out in 2006.

These credits would be available for all qualifying vehicles, including cars, minivans, sport utility vehicles, pickup trucks, and electric vehicles. The revenue cost of this incentive is estimated to be \$0.7 billion for FY 1999 - 2003.

Again, we have set a very high threshold for obtaining these credits. Eligible vehicles must be two or three times as efficient as today's comparable vehicles. Tripling a car's fuel economy reduces its emissions of carbon dioxide by 67 percent; doubling a car's fuel economy reduces its emissions of carbon dioxide by 50 percent.

Equalize the tax treatment of parking and transit benefits

Under present law, qualified transportation fringe benefits provided by an employer are excluded from income. Qualified transportation fringe benefits include parking, transit passes, and vanpool benefits. Beginning in 1998, parking is excludable from gross income even when provided in lieu of other compensation payable to an employee. Transit passes and vanpool benefits, however, are only excludable if provided in addition to, and not in lieu of, any compensation otherwise payable to an employee. In 1998, the amount of employer-provided benefit that is excludable from income per month is \$175 for parking and \$65 for vanpool and transit benefits.

This initiative would equalize the tax treatment of parking benefits and transit and vanpool benefits. To encourage public transportation and vanpools, employers would be allowed to

provide tax free transit and vanpool benefits in lieu of compensation, up to the same amount that they can provide for parking beginning January 1, 1999. The revenue cost of this incentive is estimated to be \$0.1 billion for FY 1999 - 2003. A similar provision is contained in the Surface Transportation Revenue Act of 1998.

Electricity

Extension of tax credit for electricity produced from wind and biomass

Wind energy systems accounted for about .09 percent of electricity generation in 1996. What is deployable today is the result of successful R&D in the past. To encourage the production of electricity from wind and certain biomass, a 5-year extension is proposed for the present 1.5 cent per kilowatt hour tax credit (adjusted for inflation after 1992). The present credit, which applies to facilities placed in service before July 1, 1999, would be extended for five years. The revenue cost of this incentive is estimated to be \$0.2 billion for FY 1999 - 2003.

This tax credit helps to make electricity from these systems competitive with other forms of electricity generation. Electricity produced from wind energy systems produces no greenhouse gases.

CONCLUSION

Our goal has been to design a package of tax incentives to achieve reductions in greenhouse gases and to increase energy efficiency. The tax incentives have well-defined goals. Eligible items offer superior energy efficiency, use renewable energy sources, or reduce emissions of some of the most potent greenhouse gases. If taxpayers claim a credit, it is for items that produce energy savings and reductions in greenhouse gas emissions. If taxpayers do not take advantage of the credits, there is no revenue loss.

The impact of the incentives in this package on greenhouse gases will likely 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. That is why the Administration has chosen not to make speculative estimates about the potential benefits. I would like to illustrate this point with one example. I stated earlier, with respect to the tax credit for highly energy-efficient building equipment, that the affected equipment presently captures less than one percent of market sales. With the credit in place, we expect this fraction to increase significantly in the short-run. We also expect that after the credit has expired the share of the market for highly efficient building equipment will be much larger as a result of the credit. But whether it will double, or triple, or increase by a factor of 10 is unclear. The estimated impact on emissions reductions will hinge on assumptions about the long-term increase in market share which is very difficult to predict.

In conclusion, Mr. Chairman, we believe that the Administration's proposed tax incentives represent sound policy that will have long-term benefits. We look forward to working with the Congress on this matter.

**Statement of David M. Gardiner
Assistant Administrator for Policy
U.S. Environmental Protection Agency
Before the
Committee on Energy and Natural Resources
United States Senate**

June 4, 1998

Mr. Chairman and Members of the Committee, I appreciate the opportunity to appear before you to discuss the President's Climate Change Technology Initiative -- a \$6.3 billion dollar investment to help the country meet the challenge of global warming and, at the same time, achieve multiple environmental and economic benefits. We have proposed this initiative because the scientific evidence strongly supports our belief that a changing climate would pose very serious risks to public health and to the environment.

It is difficult to predict with certainty what will happen in the future, but the risks are enormous. If emissions of greenhouse pollutants are not reduced worldwide, atmospheric concentrations are expected to reach double pre-industrial levels by the year 2060. That would cause global temperatures to rise by roughly two to six degrees by the year 2100, and global sea levels to rise 6 - 38 inches.

Climatic changes on that scale would pose very serious threats to public health and the environment. For example, a doubling of current atmospheric concentrations of greenhouse pollutants could contribute to more frequent and intense episodes of urban smog, thus increasing rates of human illness and death. The projected increase in the duration and frequency of heat waves could increase mortality rates due to heat stress.

Climate change also could lead to increases in several infectious diseases, including malaria, dengue, and yellow fever, as the range of organisms that carry these diseases expands. It has been estimated, for example, that as global surface temperatures rise, by the end of the 21st century the global population will suffer an additional 50 - 80 million cases of malaria.

By the year 2100, rising sea levels could submerge 15 - 60 percent of America's coastal wetlands. These wetlands are nature's kidneys; they cleanse and purify the waters that pass through them. Their loss would be a blow to the health of humans and wildlife alike.

Groundwater aquifers and surface waters could be rendered unfit for drinking by the saltwater intrusion that could be common as sea levels rise. Seven thousand square miles of dry land in states like Louisiana and Florida could be inundated, with devastating effects on local agriculture, quality of life, and drinking water sources. Both droughts and floods are likely to become more frequent and severe as average temperatures rise, thus increasing personal and property damage.

In Alaska, rising surface temperatures will melt the permafrost – and endanger the roads and structures that rest upon it. Wildlife, forestry and commercial fishing operations will also be threatened by rising temperatures.

In short, the potential consequences of climate change go far beyond a few degree rise in average global temperatures over the next century. Rising temperatures and related climate phenomena pose a distinct and serious threat to human health, the environment, and the quality of life on earth. The Intergovernmental Panel on Climate Change stated the problem succinctly: "Climate change is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life."

In the face of this evidence, and because the effects of climate change would be so serious and so costly, the President has proposed a Climate Change Technology Initiative to allow our nation to reduce greenhouse pollution in common sense, cost-effective, and flexible ways. The partnership programs and targeted tax cuts that the CCTI will fund will improve on the success of the Administration's current climate change programs in reducing greenhouse gas emissions. And funding these programs is a wise investment in America's energy future that will benefit the economy, public health, and our environment.

The investments proposed by the President will bring economic benefits beyond those associated with the control of global warming. They will provide incentives for American businesses and communities to cut greenhouse gas emissions now in ways that make economic sense now. They will speed the adoption of today's cost-effective, energy-efficient, low-carbon technologies throughout the economy, and hasten the development of even more advanced technologies in the future. Over 85 percent of greenhouse gas emissions are associated with the burning of fossil fuels, our nation's primary fuel source. Thus, using energy more efficiently in our businesses, homes, and vehicles will save money and make our overall economy far more productive, while at the same time reducing emissions of greenhouse gases and other pollutants.

We've already seen how effective these kinds of incentives can be. Under our current Climate Change Action Plan, the Administration has negotiated more than 6,000 EPA partnerships with U.S. businesses, local governments, hospitals, universities and schools across the nation. Dozens of companies like General Motors, IBM, Motorola, and Lockheed Martin are cutting energy use, saving money, and reducing their emissions of greenhouse gases.

And they work. By 1999, continuation of existing voluntary programs can reduce greenhouse pollutants by over 40 million tons a year, and eliminate 90,000 tons of nitrogen oxides, a prime component of urban smog. In fact, every dollar we invest to improve energy efficiency and limit climate change will also control conventional air pollutants like particulates, nitrogen oxides, volatile organic compounds, and carbon monoxide. These pollutants have been linked to heightened risks of mortality, chronic bronchitis, congestive heart failure, heart disease, and other serious illnesses. Children and the elderly are most vulnerable to these pollution-related illnesses.

And these voluntary programs produce real energy savings. They can reduce U.S. energy consumption by over 45 billion kilowatt hours in 1999, providing \$3 billion in energy savings to consumers and businesses. For every dollar spent by EPA, the nation's energy bill is reduced by more than \$70.

Let me give you some examples of how rewarding these actions can be for both the environment and the economy:

- EPA partnerships with industry have resulted in significant reductions of greenhouse emissions. DuPont has taken steps to cut energy use that saved the company 31 million dollars in 1995, while reducing carbon dioxide emissions by 18 million tons by the year 2000.
- Climate Wise Partner BP America is working in Alaska to improve the efficiency of its extraction and exploration operations. In all, over the last three years, BP America has reduced emissions in Alaska alone by over 460,000 tons of CO₂ per year. This is equal to taking over 100,000 cars off the road.
- EPA and DOE have expanded their successful Energy Star programs and developed new partnerships with window manufacturers to produce more efficient windows, and with electronic manufacturers to improve the energy efficiency of new televisions and VCRs. Without any noticeable change in the product, improving the efficiency of our TVs can reduce pollution by up to a million tons of carbon per year and save consumers up to \$500 million per year on their energy bills. But TVs are just one of the many products offered under EPA and DOE's Energy Star partnerships. The Energy Star partnership with computer manufacturers, launched in 1992, delivered several hundred million dollars in energy bill savings to consumers and businesses in 1997 -- all from computer systems that use energy more efficiently and reduce pollution simultaneously.
- Under the Energy Star Buildings program, the Empire State Building, the World Trade Center and other major office buildings have agreed to achieve significant reductions in greenhouse gas emissions through the installation of energy efficient lighting and heating and cooling systems.

These voluntary programs help enhance the productivity of the American economy. They help American businesses compete more effectively in the global economy. And by reducing greenhouse pollution they help us reduce the threat of global warming. The Climate Change Technology Initiative continues this common-sense, cost-effective strategy. The President's Initiative expands these voluntary programs designed to reduce greenhouse pollutants. And if the Initiative is implemented, we can expect to achieve even greater reductions in emissions, and with greater energy savings for consumers and industry alike:

- Today, a majority of home energy-using products are now covered by the ENERGY

STAR label, including heating and cooling equipment, computers, and appliances such as refrigerators and washing machines. If over the next 15 years everyone were to buy only those energy-efficient products marked in stores with EPA and DOE's distinctive "ENERGY STAR" label, we could shrink our energy bills by a total of over \$100 billion over the next 15 years and dramatically cut greenhouse gas emissions.

- Our Energy Star Buildings objective is to profitably improve the energy efficiency of one-half of all commercial buildings and homes by the year 2010. The objective can be accomplished by improving the technologies that home and building owners purchase over the next decade, and by improving the design and construction of new homes and buildings. Achieving this objective would yield annual savings of about 70 million tons of carbon by 2010 and about 170,000 tons of nitrogen oxides while saving consumers and building owners more than \$30 billion per year.
- In the industrial sector, our objective under CCTI is two-fold: first, to work with businesses to double their normal rate of energy efficiency improvements between now and 2010; and second, to reduce methane, HFC, PFC, and SF6 emissions by 25 percent from projected baseline levels in 2010. Achieving those dual objectives in the industrial sector would result in annual reductions of about 140 million tons of carbon by 2010 and annual energy bill savings to American industry of up to \$15 billion per year by 2010.
- There is tremendous potential for emissions reductions in the transportation sector, now responsible for a full one-third of the U.S. greenhouse gas emission inventory. Our objective will be to increase the efficiency of light vehicles through the Partnership for a New Generation of Vehicles and through the introduction to the market of ultra-high fuel economy vehicles even earlier than the 2004 model year.

Some have suggested that the CCTI is a "backdoor attempt" to implement the goals agreed to by the United States and other industrialized nations under the Kyoto Protocol. This is an erroneous interpretation of this proposal. Many of the programs that will be continued and expanded under the CCTI were begun under President Bush's leadership. These programs are strictly voluntary. They are good for the economy and can save energy costs for businesses and consumers. And these programs are consistent with the criteria established under the Rio Accord of 1992 calling for effective, voluntary measures to prevent climate change. By every measure, these programs are successful, and have brought us economic and health benefits beyond those associated with the control of global warming.

As with our existing climate change programs, the Climate Change Technology Initiative programs will operate under clear performance standards. EPA's agency-wide Strategic Plan outlines specific goals, objectives and milestones for all climate-related programs and activities. In accordance with the Government Performance and Reporting Act, EPA has developed a successful and extensive system of performance measures and program evaluations for the climate programs. We devote considerable effort to obtaining the best possible information upon

which to evaluate our programs. For example, EPA reports the results of the Green Lights program based exclusively on detailed reports submitted by the program's partners on over 14,000 completed projects around the country. We are confident that these important programs can provide maximum accountability and generate valuable information for future program development.

The EPA and DOE work together under a signed memorandum of understanding that ensures complete cooperation between our agencies in managing and evaluating these voluntary programs and the emissions reductions achieved. The effective evaluation of individual program results is a key aspect of the program implementation process. Climate Wise companies agree in joining the program to develop comprehensive Action Plans that describe and quantify actions undertaken to reduce greenhouse gas emissions. These plans are then subjected to a rigorous interagency review process to ensure accuracy under sector-wide emissions reduction plans.

The Administration evaluates the effectiveness of its climate programs through an interagency program review. The first such interagency evaluation, chaired by the White House Council on Environmental Quality, examined the status of the Climate Change Action Plan. The review included participants from EPA, DOE, DOC, DOT, and USDA, as well as White House offices. The results were published in the *U.S. Climate Action Report-- 1997* as part of the United States Submission to the Framework Convention on Climate Change. There were several opportunities for public comment. The Administration will continue to evaluate the future effectiveness of the climate programs through a White House coordinated, interagency process.

This is an economically sound and environmentally sensible approach. We hope the Committee will give these programs the utmost consideration. We thank you for your continued assistance and look forward to working with you in our efforts to prevent climate change and provide a better quality of life for all our people.

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**6/4/98 SENATE COMMITTEE
ON SMALL BUSINESS**

Divider Title: _____

Congress of the United States

House of Representatives

105th Congress

Committee on Small Business

2361 Rayburn House Office Building

Washington, DC 20515-6515

Final Witness List

Oversight Hearing on the Kyoto Protocol: The Undermining of American Prosperity?

Thursday, June 4th, 1998

10:00 AM

2360 Rayburn House Office Building

First Panel

Honorable Janet L. Yellen
Chair
Council of Economic Advisers
Washington, DC

Second Panel

Mr. Raymond J. Keating
Chief Economist
Small Business Survival Committee
Washington, DC

Mr. Terry F. Steinbecker
President & CEO
St. Joseph Light & Power Co.
St. Joseph, MO

Mr. Harry C. Alford
President & CEO
National Black Chamber of Commerce
Washington, DC

Mr. C. Frederick Dahlberg, Jr.
President
St. Mary Galvanizing Company
Morgan City, LA

Mr. Howard Geller
Executive Director
American Council for an Energy
Efficient Economy

Mr. Marlo Lewis, Jr.
Vice President for Policy and Coalitions
Competitive Enterprise Institute
Washington, DC

**TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SMALL BUSINESS**

JUNE 4, 1998

Thank you, Mr. Chairman. The President has said that we can work to avert the grave dangers of climate change, while at the same time maintaining the strength of our economy. I agree and am pleased to have this opportunity to appear before the Committee to elaborate on the Administration's views on these issues.

The international agreement that was reached in Kyoto this past December is a crucial step forward in addressing global climate change. But it is only one step in a journey. Since the international effort to reduce greenhouse gas emissions is still in some respects a work-in-progress, it is not yet possible to provide a full authoritative analysis of it. Many of the specifics in several crucial areas are not completely resolved in the diplomatic arena, forcing analysts to make a variety of assumptions about the ultimate form of the international regime. In my testimony today, I will attempt to identify key elements of the agreement and the Administration's policy, such as international emissions trading, meaningful developing country participation, inclusion of land-use activities that absorb carbon ("sinks") and six categories of gases, as well as domestic initiatives, that together can ensure that reductions in global greenhouse gas emissions are consistent with continued strong economic growth. I will explain the reasoning underlying our conclusion that, under these conditions, economic impacts are likely to be modest.

The Administration is strongly committed to ensuring that these key elements are reflected in our domestic and international climate change policies. We are firmly committed to meaningful developing country participation, the use of sinks to offset emissions requirements, and emissions trading both domestically and internationally. And as you know, the President's FY 1999 budget includes a \$6.3 billion package of tax cuts and R&D investments over the next 5 years; this package makes good sense in terms of energy policy and will jumpstart our efforts. A final component of the President's climate change policy is his support for electricity restructuring in a manner that will offer approximately \$20 billion in cost savings to electricity consumers, while reducing greenhouse gas emissions.

I. Basic Economic Rationale of the Kyoto Treaty

To begin our analysis, it may be worth stepping back and examining the larger question of the basic rationale, from an economist's perspective, for the Kyoto Protocol.

The earth's surface appears to be warming from the accumulation of greenhouse gases from myriad sources worldwide. None of these emitters presently pays the cost to others of warming's adverse effects -- a classic externality in the language of economists. As a result of these distorted incentives, disruption of the Earth's climate is likely to proceed at an excessive pace and if left uncontrolled may pose substantial costs in terms of harm to commerce and the environment alike. The fundamental economic logic of the Kyoto Protocol is thus that without such an international agreement, individual nations will not have the proper incentives to address the threats from global climate change.

II. Costs of Climate Change

In evaluating efforts to mitigate global warming, the first step is to consider the costs of inaction. These costs --and they are significant-- provide the primary motivation for actions to reduce greenhouse gas emissions.

The Intergovernmental Panel on Climate Change (IPCC) jointly established by the World Meteorological Organization and the United Nations Environment Programme, concluded in 1995 that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of carbon dioxide, methane, nitrous oxide, and the other so-called greenhouse gases have reached levels well above those of preindustrial times. Of these, carbon dioxide (CO₂) is the most important: net cumulative CO₂ emissions resulting from the burning of fossil fuels and deforestation account for about two-thirds of potential warming from changes in greenhouse gas concentrations related to human activity.

Climatic Impact

If growth in global emissions continues unabated, the atmospheric concentration of CO₂ will likely double relative to its preindustrial level by midway through the next century and continue to rise thereafter. As a result of the increased concentration of CO₂, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. While scientists believe that human activities are leading to a gradual warming of the *average* temperature of the earth, the change in temperature in a given region at a given time may differ substantially from this average. Indeed, models predict warming will be greater in high latitudes than in the tropics, and greater over land than ocean.

Potential consequences associated with this shift in climate include a rise in sea levels, greater frequency of severe weather events, shifts in agricultural growing conditions from changing weather patterns, threats to human health from increased range and incidence of diseases, changes in availability of freshwater supplies, and damage to ecosystems and biodiversity.

Economic and Monetary Damages

The derivation of quantitative or monetary estimates of the damages from such a change in the climate is extremely difficult given the capacity of today's models. Estimates of the economic damages from climate change fall into the following broad areas: agriculture, sea-level rise, air conditioning and heating, water supply, human life and health, air pollution, and other costs (hurricanes, relocation costs, human amenity, construction, leisure activities, urban infrastructure, and ecological damages such as forest loss and species loss). Although the quantification of these effects is quite demanding, researchers have developed estimates that prompt substantial concern. The IPCC reports that a doubling of carbon dioxide levels would lead to approximately 10,000 estimated additional deaths per year for the current U.S. population from higher summer temperatures, even after netting out the effects of warmer winters and assuming acclimatization. Other researchers have predicted sea level increases of about 20 inches by 2100, with greater increases in subsequent years.

Despite the difficulties, respected researchers have developed estimates of the monetary damages expected from an average worldwide temperature increase. For example, William Cline, then of the Institute for International Economics, estimated that a temperature change of 4.5 degrees Fahrenheit would impose annual damages of about 1.1 percent of GDP per year on the U.S. economy. That amounts to \$89 billion in today's terms. (Cline's original estimate is quoted in 1990 dollars. The figure given above translates this number into 1997 terms by scaling it to current GDP.) William Nordhaus of Yale University has likewise computed estimates of the dollar loss attributable to a doubling of greenhouse gas concentrations. Although he uses methods that differ from Cline's in several respects, Nordhaus estimates that a slightly larger temperature change of 5.4 degrees Fahrenheit would impose losses equal to about 1 percent of GDP. A third independent estimate reported by Nordhaus is close to Cline's. It must be noted, however, that this similarity among aggregated estimates masks the true uncertainty associated with forecasts of the damages from given increases in global warming -- the estimates are all fundamentally based on extrapolations from current and past experience, and may not fully incorporate effects that will unfortunately become apparent only with future experience.

One key difficulty in interpreting and monetizing these estimates of damages is uncertainty over the extent that they should be discounted because they occur in the distant future. Since the benefits of stemming future climate change accrue over not only decades but centuries, small changes in the discount rate can produce substantial changes in the results. But the precise discount rate that should be used to evaluate questions as important as the future climate of the planet remains a subject of intense debate. It is safe to say that there is, as yet, no professional consensus on the issue. Indeed there can be no technical answer to the ethical question how we should value the welfare of future generations.

A similar difficulty with such estimates is that they do not include potential nonlinearities in the relationships between greenhouse gas concentrations and temperature, between temperature and economic damages, or in the various other complicated relationships governing interactions between greenhouse gas emissions, the climate, and the economy. Current estimates of damages do not, and cannot, accurately reflect the value of reducing the unknown risk of large-scale and potentially irreversible discrete events with potentially catastrophic consequences.

Two such possibilities serve as illustrations. Warming of Northern tundra may release huge amounts of methane from the permafrost, thereby leading to accelerated warming. We do not know at what point, if any, such potentially unstable activity would be triggered. Second, evidence from climate models suggests that some types of climate change may lead to changes in ocean currents, including weakening of the Gulf Stream that warms Western Europe. Scientific evidence suggests that abrupt seawater temperature shifts have occurred over periods as short as decades.

To what extent are we willing to take such chances with our planet? There is a strong argument for the Kyoto Protocol as a form of planet insurance. But what numerical weight should one assign to these catastrophic risks? In other words, what is the value of the insurance policy? Although it is difficult for an economist, or anyone, to know, reductions in the risk of such catastrophic outcomes must be considered in addition to the costs and benefits that can be reasonably quantified. Since human beings are typically averse to risk, such catastrophic risks are especially important in evaluating whether the benefits of a particular climate control policy justify the costs. One must have at least some sympathy with those who criticize economists on the grounds that the effects of climate change are extremely difficult to quantify in a single monetary number.

III. Addressing Global Climate Change in an Efficient Manner

The costs of unabated climate change may thus be difficult to quantify, but they are nonetheless real and provide the motivation for reducing greenhouse gas emissions. In taking action to reduce those emissions, economic analysis suggests that two elements are absolutely essential:

- The effort must be global, to address the global externality inherent in the nature of the problem.
- The effort must be flexible and market-based, to ensure that we achieve our objectives in the most efficient manner possible.

Need for Global Action

Climate change is a global problem requiring a global solution. As I mentioned earlier, no single country has an incentive to reduce emissions sufficiently to protect the global environment against climate change. Each has an economic incentive to "free ride" on the efforts of others. Even if the United States sharply reduced its emissions unilaterally without an international agreement limiting emissions abroad, greenhouse gas emissions from all other countries would continue to grow, and the risks posed by climate change would not be significantly reduced. It is important to emphasize that emissions of different gases anywhere in the world have very similar effects on global climate.

The threat of disruptive climate change has led to coordinated international efforts to reduce the risks of global warming by reducing emissions of greenhouse gases. A landmark international agreement to address global warming was the Framework Convention on Climate Change signed during the Earth Summit in Rio de Janeiro in 1992. This convention established an objective of limiting greenhouse gas concentrations and called upon industrial countries to return their emissions to 1990 levels by 2000. Since then, it has become clear that the United States and many other participating countries will not meet this voluntary goal; quite the contrary, emission levels have continued to rise not fall among both developed and developing countries.

To address the lack of progress among many industrialized countries toward meeting the Rio objective, the United States and approximately 160 other nations agreed in negotiations held in Kyoto, Japan, last December, to reduce emissions of greenhouse gases. The Kyoto Protocol, which requires the advice and consent of the Senate, would place binding limits on each industrial country's combined emissions of the six principal categories of greenhouse gases: carbon dioxide (CO₂), nitrous oxide (N₂O), methane, sulfur hexafluoride, perfluorocarbons, and hydrofluorocarbons. These limits apply to the 38 so-called Annex I countries, which are the industrialized countries, defined to include Russia, Ukraine, and most Eastern European countries.

Under the Kyoto Protocol, each industrial country's baseline is its 1990 emissions of CO₂, methane, and N₂O and its choice of 1990 or 1995 levels of the other three categories of gases. The United States agreed to a target of 7 percent below this baseline by the period between 2008 and 2012. Given the changes in the definition of the baseline for the three long-lived chemical compounds (HFCs, PFCs and SF₆) from 1990 to 1995 combined with a change in the way sinks are accounted for in the baseline, the actual reduction required in the U.S. is no more than 2-3% more than the President originally proposed as the U.S. negotiating position. The targets for the European Union and Japan are 8 percent and 6 percent below 1990 levels, respectively. Australia, New Zealand, Norway, Russia, and Ukraine all have limits somewhat less ambitious when phrased as cuts relative to their 1990 levels. In sum, over the period from 2008 to 2012, the industrial countries are expected to reduce their average emissions of greenhouse gases to about 5 percent below their 1990 levels.

The President has made clear that he will not submit the Kyoto Protocol to the Senate without meaningful participation from key developing countries (who are not included in Annex I).

There are several reasons why meaningful participation from developing countries is essential. First, developing countries are projected to contribute a majority of world emissions around 2030 under a continuation of business-as-usual. Without the participation of developing economies, efforts by the industrialized countries to limit emissions will therefore not provide adequate protection from climate change.

Second, developing country participation is crucial because it would permit relatively low-cost emissions reductions to be internationally recognized as a substitute for more expensive emissions reductions that might otherwise be achieved domestically by U.S. companies and those in other industrialized countries. Since greenhouse gas emissions have the same basic impact on the climate regardless of where they occur, emission reductions in developing countries have the same environmental benefit as reductions in the U.S. But these reductions are much less costly than reductions in the U.S. or in other developed nations, because of the very inefficient and carbon-intensive uses of energy in these countries today. It thus makes sense, from both an environmental and an economic perspective, to incorporate emissions reductions in developing countries into the international system.

Third, principles of basic fairness suggest all countries should do their part, depending, in part, on their ability to contribute to the solution. Thus even poor countries should participate, although the lack of resources in such countries may limit the extent of their participation.

Some have expressed fears that the Kyoto Protocol might adversely affect the competitive position of American industry. Evaluating how the Kyoto Protocol could affect competitiveness of a few specific manufacturing industries -- especially those that are especially energy-intensive, such as aluminum and chemicals -- is complex. The answer depends, in part, on the impact of the agreement on energy prices, which we will shortly address. In general it is difficult to undergo a structural change in the economy without having the effect of expanding some sectors and contracting others. But to provide some perspective on this issue, consider the following facts. First, on average, energy constitutes only 2.2 percent of total costs to U.S. industry. Second, energy prices already vary significantly across countries. According to the *1997 Statistical Abstract*, for example, in 1996 premium gasoline cost \$1.28 per gallon in the United States -- but only 8 cents per gallon in Venezuela. Similarly, gas prices were \$3.71 per gallon in Switzerland and \$4.41 per gallon in France. Electricity prices also vary significantly: in the U.S., for industry, they were 5 cents per kilowatt hour in 1995, a fraction of prices in Switzerland of 13 cents per kilowatt hour. Yet U.S. industry is not moving en masse to Venezuela, nor is Swiss industry moving to the United States. Third, roughly two-thirds of all emissions are not in manufacturing at all, but in transportation and buildings, sectors which, by their very nature, are severely limited in their ability to relocate to other countries. We therefore believe we need developing country participation because the problem is global and cost-effective solutions are essential, than to avoid adverse effects on competitiveness.

Flexibility and Market Mechanisms

A global solution is thus critical to the global problem of climate change. Globalizing the solution is not, however, enough by itself. We must also ensure that our reductions in global greenhouse gas emissions are attained in the most efficient manner possible. The nature of the climate change problem suggests three basic methods to lower costs of achieving given levels of environmental protection. They can be characterized in terms of three categories of flexibility: (1) "when" flexibility; (2) "what" flexibility; and (3) "where" flexibility, which may be the most important of all. Such methods have long been championed by economists interested in increasing the efficiency of protection. Indeed, over 2,500 economists from academia, industry, and government alike urged such approaches in a letter they signed last year advocating action on climate change:

"Economic studies have found that there are many potential policies to reduce greenhouse gas emissions for which the total benefits outweigh the total costs...The most efficient approach to slowing climate change is through market-based policies."

1. "When flexibility" (timing)

First is "when flexibility" or timing. Since climate change is a long-term problem, the exact timing of emissions reductions is, within some range, not of primary importance. Thus the freedom to delay or accelerate reductions within an agreed upon time frame -- while ensuring credibility of emissions reductions -- lowers costs.

As a result of U.S. leadership, the Kyoto Protocol incorporates this principle of "when flexibility" in four ways:

- First, the initial emissions reductions are less severe, and the period over which they occur ends much later than what had been proposed by many other countries. By adopting a gradual and credible path of reductions in the early years, we can greatly reduce costs such as those from prematurely scrapping coal-fired electricity plants, while attaining the same ultimate environmental goals.
- Second, under the Kyoto Protocol, the emissions target is not specified in terms of a specific year, but rather in terms of an average over a five-year period (2008-2012). Averaging over five years, instead of requiring countries to meet a specific target each year, can lower costs, especially given an uncertain future. The averaging can smooth out the effects of short-term events such as fluctuations in the business cycle and energy demand, or hard winters and hot summers that would increase energy use and emissions.

- Third, there is allowance for “banking” emission reductions within the 2008-2012 commitment period, for use in a subsequent commitment period [although the emission targets of the subsequent periods have not yet been specified].
- Fourth, CDM credits achieved between 2000 and 2008 may be banked until 2008 to 2012.

2. “What flexibility” (gases and sinks)

The second type of flexibility is “what flexibility”, along two dimensions. The first is the inclusion in the agreement of all six greenhouse gases. Emissions of different kinds of gases, not just carbon dioxide, contribute to the greenhouse effect. Since the IPCC has developed conversion factors for all greenhouse gases by estimating their global warming potentials, reductions in emissions of one gas can be used to substitute for increases in emissions of another by an amount that has equivalent environmental effects. Again at U.S. urging, all six gases are included, while Japan and the EU had insisted until the end on covering only three. Thus the U.S. succeeded in having the Kyoto Protocol stipulate that countries with binding targets are to reduce their *total* greenhouse gas emissions by certain percentages, but does not require specific reductions for specific gases. Since a molecule of sulfur hexafluoride is 23,900 times more potent over 100 years than a molecule of CO₂, it may be cheaper to achieve the same environmental benefit by eliminating one molecular unit of SF₆ than nearly 24,000 units of CO₂.

Some initial analysis indicates that a strategy of reducing non-CO₂ greenhouse gas emissions by a greater percent than CO₂ emissions could lower emissions permit prices by as much as 10 percent. Thus allowing countries flexibility in what gases they reduce -- essentially trading emissions reductions across gases -- can help lower significantly the costs of meeting their targets.

The second source of “what flexibility” is the treatment of sinks, i.e., land use activities that promote the removal of carbon from the atmosphere through the growth of plants. At the urging of the U.S. delegation, sinks can be used to offset emissions targets. Promoting such sinks through afforestation and reforestation may reduce atmospheric concentrations of CO₂ at much lower costs than reducing emissions of greenhouse gases.

3. “Where flexibility” (international)

The third type of flexibility, and perhaps the most important, is “where flexibility” (international). As I have already emphasized, emissions have the same environmental consequences regardless of where in the world they occur. Therefore, the least-cost approach to controlling climate change is to reduce emissions wherever such reductions are cheapest. The Kyoto Protocol, because of U.S. insistence and persistence, includes three important cost-saving provisions of this nature.

- First, it provides the opportunity for countries that take on binding targets to trade rights to emit greenhouse gases with each other. This market in emissions permits could ensure that emissions reductions occur where they are least expensive within the industrial countries. In particular, U.S. companies could purchase emissions reductions in other participating countries when doing so would reduce their costs -- thus lowering costs without affecting the level of environmental protection. While currently only industrialized countries have emissions caps, this mechanism also offers an incentive for developing countries to take on emissions targets.

- Second, the agreement provides for Joint Implementation by Annex I countries. Thus if some countries do not develop programs to trade permits internationally, U.S. firms could nonetheless implement projects in those countries for which they could receive emissions reductions credits in the U.S.

- Third, the agreement allows industrial countries to invest in "clean development" projects in the developing world and use these projects' certified emissions reductions toward meeting their targets. Many such clean development projects may be quite cheap in terms of the cost per ton of emissions avoided, as has been illustrated by the Joint Implementation pilot program that is already in place in the U.S.

Details of how these provisions will operate will be discussed in future negotiations such as the one in Buenos Aires later this year. Nonetheless, effective international trading of emission credits, Joint Implementation, and the Clean Development Mechanism can lead to substantial reductions in costs relative to alternative policies that do not exploit the power of market incentives. To illustrate briefly the ability of U.S. industry to perform beyond expectations when given appropriate economic incentives, consider further EPA's highly acclaimed sulfur dioxide (SO₂) program, which relies, among other things, on a system of tradeable permits to reduce emissions of SO₂ from electric utilities. The SO₂ program has been successful in several ways: a large number of utilities participate, SO₂ emissions and ambient concentrations have fallen and the costs of reducing emissions are considerably lower than originally forecast.

As has been frequently noted, the average cost of SO₂ emissions reductions has recently been significantly lower than was originally forecast, in part due to the role of incentives in fostering innovation. Emission permit prices, currently at approximately \$100 per ton of SO₂, are well below earlier estimates of around \$250 to \$400 per ton.

Trading programs may not always bring cost savings as large as those achieved by the SO₂ program; trading programs will not always be accompanied by the discovery of much cheaper control strategies. However, the SO₂ experience demonstrates clearly how programs like international permit trading, Joint Implementation, and the Clean Development Mechanism will lead firms to find cheaper ways of reducing emissions that can lead to unexpectedly low costs.

IV. Difficulties of Economic Analysis of the Kyoto Protocol

Now that we have a Protocol -- even if it is not yet fully complete nor ready for the President's submission to the Senate -- it is possible to examine it in somewhat more detail from an economic perspective. But, once again the inherent limitations of any such estimates deserve emphasis. Such limitations should not be surprising to you: economists have a difficult enough time projecting the behavior of the economy over the next quarter or year, let alone over the next two decades. The scale of the forecasting exercise is therefore daunting, and any specific results should be treated with substantial caution.

The difficulties associated with economic analysis of climate change fall into three broad categories. First are the uncertainties that still remain over the terms of the ultimate treaty, necessitating assumptions on which the analysis is predicated. Second are the inherent limitations of available models to analyze even short-term costs and benefits. And finally is a topic discussed earlier: the impossibility of putting a single monetary number on the long-term benefits of climate change mitigation, although there will clearly be economic benefits of emission reductions.

Uncertainties in the International Effort to Combat Climate Change

The Kyoto Protocol was an historic accomplishment, delineating the broad terms of the international effort to address climate change. But although we know a lot more than we did before Kyoto about how that international system can work, and that informs our analysis, there is still much that we do not know.

First, some provisions raise complex implementation issues. At issue here is the treatment of so-called sinks -- activities that affect the rate at which carbon is removed from the atmosphere and "sequestered," e.g., by the planting of trees.

Second, the details of a number of items -- primarily concerning international trading, the Clean Development Mechanism, and developing countries -- are the subject of further discussions including future negotiations in Buenos Aires next fall, because they had not been definitively settled by the end of the Kyoto talks.

Finally, and most importantly, we have not yet negotiated international agreements to limit emissions beyond the 2012 window. The emission cuts agreed upon at Kyoto are only a first step on a long journey. The first step that we propose to take over the next 15 years is critical. But the reason it is critical is *not* that, by itself, it will solve the climate change problem -- emissions during any given decade are small compared to the cumulative concentrations in the atmosphere. Rather, the first step is critical because we can not take the second and third steps until we have taken the first. At the same time, any analysis is complicated by the lack of knowledge over what the subsequent steps will be.

Inherent Limitations of Models

In addition to these uncertainties about the details of the international effort to address climate change, are the inherent limitations of the models used to evaluate that effort. Even within a given model, answers depend critically on the precise nature of the question asked. For example, the costs of emissions reductions depend critically on the extent of global participation and international trading that a treaty is assumed to feature. But in addition to the dependence of the results from a given model on the precise assumptions, different models can give different answers even when all the assumptions are specified to be the same -- a concrete illustration of the range of uncertainty to which we must assign the predictions of any one individual model.

One area in which the uncertainty is particularly large is the pace of technological progress --especially the diffusion of existing energy-efficient technologies, but also the development of new technologies -- and the extent to which the pace will accelerate in response to government programs. Models and experts on climate change policy tend to have a wider range of disagreement on the scope for speeding the diffusion of existing energy-efficient technologies than on any other single issue.

Furthermore, each model has strengths and weaknesses; each has questions to which it is better or worse suited to answer. Some, for example, model the energy sector in detail. Some allow for the fact that a coal-fired power plant cannot costlessly be converted to one that runs on natural gas. Some show the effects of hypothetical tax cuts made possible by the new revenues earned through the auction of emissions permits. Some are capable of showing recessions and booms. Others include a long-term "carbon cycle" model that can keep track of the accumulation of greenhouse gas concentrations in the atmosphere and their climatological effects. Some break down the rest of the world into regions and so can model international trade. No one model does everything, and therefore we must not rely blindly on the results of any one model or set of models. Professional judgement and economic intuition, along with diplomatic assessments, are also crucial.

Benefits of Averting Climate Change

As discussed above, it is evident that the benefits of averting climate change are potentially immense. But we have chosen not to try to quantify them in monetary terms, in light of the difficulties we have enumerated. These include the uncertainty of these benefits, their timing and therefore the extreme sensitivity of the results to the chosen discount rate, and the dependence of benefits on emissions paths after the 2008 to 2012 budget period specified in Kyoto.

V. Assessing the Kyoto Protocol

In order to evaluate the likely net economic impact of the Kyoto Protocol, *excluding the benefits of mitigating climate change itself*, we have drawn upon a variety of tools to assess the various possible costs and non-climate benefits of the Administration's emissions reduction policy. To give away the punch line, our conclusion is as follows: the net costs of our policies to reduce emissions are likely to be small, assuming those reductions are undertaken in an efficient manner and we are successful in securing meaningful developing country participation as well as effective international trading, and the Clean Development Mechanism in future negotiations. That potential small net premium, even excluding the benefits of mitigating climate change, in effect, purchases a partial insurance policy against a serious environmental threat.

Because the results from any model must be treated with caution, the Administration has employed a broad set of economic tools to assess the Kyoto Protocol. We have drawn on the insights of a wide range of models of the energy sector and economy over the next 25 years, including but not limited to the results of the Stanford Energy Modeling Forum exercises, the IPCC's review of the economic and social dimensions of climate change, the work of the OECD on Economic Dimensions and Policy Responses to Global Warming, and the staff-level Interagency Analytical Team analysis produced last year. Other tools include simple relevant statistics, "meta-analyses" such as work by the World Resources Institute, models, and basic economic reasoning. Drawing on this broad array of analytical tools is crucial to an intelligent evaluation of the policy alternatives.

To our knowledge, no model -- whether used inside the government or not -- has yet been set up to analyze the implications of the Kyoto Protocol, since this agreement is only a few months old and remains unfinished. In particular, no model is currently designed to assess Kyoto's treatment of sinks, or all six greenhouse gases. Some model-builders outside the government tend to take as long as several years to incorporate changes in policy parameters into their models.

Our thinking has been informed, however, by simulations conducted with the Second Generation Model of Battelle Laboratories, one of the leading models in the field. The SGM is one of the models best positioned to analyze the role of international trade in emission permits, which we consider to be a critical element of the Kyoto Treaty. However, the SGM does not cover all six gases included in the Kyoto Protocol or include a role for sinks. We have used the SGM model as one input into our overall assessment of the Kyoto treaty, but have attempted to supplement its results with additional analysis to account for such special features of the agreement as the inclusion of six gases, a possible trading arrangement that could include a subset of the Annex I countries and the Clean Development Mechanism. We will share with you today some preliminary results of this analysis. To the extent possible, we have compared results obtained with the SGM model with those of other modelling efforts.

Mindful of the limitations of any single model, we are eager to see features of the Kyoto Protocol assessed by other models to obtain a better feel for the range of possible effects. This work is just beginning and much of it will continue to go on outside the government. For example, the Energy Modeling Forum, based at Stanford University, is a long-running model comparison exercise involving many of the leading climate models. EMF is currently studying how features of the Kyoto legal language can be translated into terms recognizable to economic modelers. We expect that the group will conduct a full scale analysis of the Kyoto Protocol. The Energy Modeling Forum believes that its members will need at least until mid-year to update their results.

VI. Assessing the Potential Costs of Emissions Reductions

I said in Congressional testimony last July that we can do this smart or we can do this dumb. I was referring to the point that the costs of cutting emissions can be much reduced if flexible, market-based mechanisms are used. Our economic analysis highlighted the importance of such flexible, market-based mechanisms -- which are therefore reflected, at the President's insistence, in the Kyoto Protocol and our ongoing diplomatic strategy.

Within the Kyoto Protocol, this means an insistence on international trading, Joint Implementation, the Clean Development Mechanism, and, ultimately, on meaningful developing country participation. Domestically, this means that we implement any emissions reductions through a market-based system of *tradeable* emissions permits, which ensures that we achieve reductions wherever they are least expensive. But this also means taking serious and responsible steps in the short run to prepare us to meet our obligations in the longer term.

The first such step is the inclusion in this year's budget of an aggressive, \$6.3 billion program of tax cuts and R&D investments -- \$1.3 billion more than the \$5 billion package the President promised in his October 22 speech on this issue. The goal is both to stimulate the development of new energy-saving and carbon-saving technologies and to encourage the dissemination of those that exist already. The proposed package contains \$3.6 billion over the next 5 years in tax cuts for energy efficient purchases and renewable energy, including tax credits of \$3,000 to \$4,000 for consumers who purchase highly fuel efficient vehicles, a 15 percent credit (up to \$2,000) for purchases of rooftop solar equipment, a 20 percent credit (subject to a cap) for purchasing energy-efficient building equipment, a credit up to \$2,000 for purchasing energy-efficient new homes, an extension of the wind and biomass tax credit, and a 10 percent investment credit for the purchase of combined heat and power systems. The package also contains \$2.7 billion over the next 5 years in additional research and development investments -- covering the four major carbon-emitting sectors of the economy (buildings, industry, transportation, and electricity), plus carbon removal and sequestration, Federal facilities, and cross-cutting analyses and research. One example of the R&D effort is the Partnership for a New Generation of Vehicles (PNGV). PNGV is a government-industry effort to develop attractive, affordable cars that meet all applicable safety and environmental standards and get up to three times the fuel efficiency of today's cars. In FY99, the combined proposal for PNGV is \$277 million, up from \$227 million appropriated in FY98. Similar government-industry efforts are proposed to develop more efficient diesel engines for both light trucks and heavy trucks.

A second responsible step entails industry-by-industry consultations to prepare emission reduction plans in key industrial sectors. The Administration will work in partnership with industry to identify ways in which the Federal government might remove regulatory hurdles that discourage energy efficiency. In addition, DOE will spearhead a comprehensive effort to improve the energy efficiency of the Federal government's own operations and purchases.

The third step is the promotion of an environmentally-responsible electricity restructuring bill, which the President identified as part of his domestic climate change package in his address to the National Geographic Society on October 22. An electricity sector freed from government regulation would be a more efficient energy sector. Costs to consumers would fall. In addition, stronger incentives for improved generation efficiency in conjunction with appropriate market based provisions could achieve modest reductions in emissions. A reasonable overall estimate of the contribution of federal electricity restructuring to the rest of the President's program to address climate change is that it would make further progress to the same emission reduction goals at a cost saving of roughly \$20 billion per year. These steps should be taken regardless of Kyoto, because they make sense in terms of energy efficiency. But they have the added benefit of preparing us for Kyoto.

Estimated Reduction in Costs from Annex I Trading

In the language of the treaty, "Annex I," is the set of countries that have agreed to take on binding limitations in emissions of greenhouse gases. Even without meaningful developing country participation -- which, again, the President has emphasized is essential before the treaty would be submitted for ratification -- costs could be reduced substantially by emission trading among the Annex I countries. To provide some indication of the possible efficiency improvements, Russia and Ukraine consume six times as much energy per dollar of output as does the United States. Such large international differences in energy efficiency suggest that adoption of existing U.S. technology would yield very large emissions reductions in these countries.

Estimates derived from the SGM model confirm that emissions trading among Annex I countries can reduce the cost to the United States of achieving its targets for 2008-2012 emissions by about half relative to a situation in which such trading was not available. This concept of costs is meant to capture aggregate resource costs to the US economy, including the cost to domestic firms of purchasing emission permits from other countries where emission reductions may be cheaper than in the United States. Although these estimates reflect idealized international trading in efficient markets, the overall conclusion is clear. The dramatic reduction in costs potentially available from Annex I trading within the SGM model -- cutting the costs involved by half -- highlights why the President insisted that international trading be part of the Kyoto Protocol; and why its achievement by our negotiators in Kyoto was such an important accomplishment.

Estimated reduction in costs from umbrella trading

One possibility that emerged in Kyoto, which none of us foresaw, was the idea developed there by the U.S. delegation, that the United States might undertake trading with a subset of Annex I countries, dubbed the "umbrella". Countries that have expressed interest in the umbrella include the United States, Australia, Canada, New Zealand and Russia, with strong indications of interest from some others. This subset of Annex I countries shares a common interest in promoting market-based mechanisms, most specifically, fully flexible rules for international trading of emissions permits.

It is too early to state the precise form the umbrella will take. But we can envision a number of potential benefits. The umbrella could, for example greatly reduce costs to the U.S. Results that we have derived from various SGM simulations of efficient international trading suggest that, relative to the situation in which there is no trading at all, the umbrella can reduce costs by an estimated 60-75 percent, depending on whether the former Warsaw Pact countries fall within the umbrella. The Kyoto Protocol classifies these countries outside of the EU bubble for the first budget period 2008-2012.

Estimated reduction in costs from developing country participation

The next consideration is participation by developing countries. The President has said that he will not submit the treaty for ratification without meaningful participation by key developing countries. Such participation would further reduce the costs involved.

The substantial potential gains from meaningful developing country participation are highlighted by the significant benefits that will likely accrue from the limited role that the developing countries have already agreed to: the Clean Development Mechanism (CDM), modeled after the U.S. joint implementation concept. The CDM cannot realistically be expected to yield all the gains of binding targets for developing countries, but it might shave costs by roughly another 20 to 25 percent from the reduced costs that result from trading among Annex I countries.

Another possibility is that we persuade some of the key developing countries that are the largest emitters to commit to targets, and allow us to buy emission reductions from those paths. Simulations with the SGM model suggest that full participation by non Annex I countries could cut roughly 55 percent off the reduced costs that result from Annex I trading. The actual cost reduction would depend on the extent of developing country participation that is ultimately obtained, as well as the effectiveness of international trading arrangements. The more developing countries that take on modest binding targets and trade in international permit markets, the lower will be costs.

These cost-saving opportunities are fundamental tenets of the U.S. position. The promise of Kyoto cannot be achieved without effective emissions trading. Moreover, if we do not get meaningful participation by key developing countries, we won't submit the treaty for ratification to the Senate. So, while our analysis may be predicated on some ambitious conditions concerning trading and developing country participation, it is exactly those conditions that form the foundation of the U.S. position in international negotiations including those at Buenos Aires.

Accounting for Carbon Sinks

The preceding discussion has emphasized the importance of trading arrangements and the CDM. In reaching an overall economic assessment, it is also important to factor in the potential role of carbon sinks. Again, the U.S. delegation obtained a novel concept, that carbon absorbing activities called sinks could be used to offset emissions. The arrangements concerning carbon sinks in the Kyoto Protocol have received less attention than they merit. The Kyoto Protocol specifies that removals of CO₂ by sinks count toward meeting the target. The Kyoto Protocol counts the net emissions effects of three sink activities --afforestation, reforestation, and deforestation. Very preliminary estimates of the implications for the United States of the Kyoto provision on sinks indicate that carbon sinks could comprise a significant portion of the total required emissions reductions. Moreover, decreasing the required emissions reduction by, for example, 10% would likely result in cost-savings greater than 10%.

Even this estimate of the effect of sinks is conservative in one respect: it is based on an assumption for sink activity in the U.S. over the 2008-2012 period, and no assumed benefits from sinks elsewhere in the world. Very preliminary estimates suggest that incorporating the gains from sinks *throughout the world* can substantially reduce the costs of meeting the Kyoto target, on top of the gains from trading among Annex I countries. (Furthermore, no model has yet even tried to take into account that government policies can help increase the activities qualifying as allowable sinks, like some tree-planting.) Because the quantitative uncertainty is so large, we do not yet have an estimate with which we are comfortable. But we expect that complete modelling of the Kyoto provision pertaining to sinks will likely have favorable and potentially large effects on projected costs.

Accounting for the role of improvements in energy efficiency

Another issue in analyzing the Kyoto protocol concerns future improvements in energy efficiency due to innovation and diffusion of existing technology. The parameter that figures most prominently in analysis of energy efficiency is the rate of improvement in the so-called Autonomous Energy Efficiency Index (AEEI), that is the rate at which the total use of energy falls relative to GDP. A plausible assumption on the AEEI is an improvement of 1.0 percent per year. Reflecting a conservative interpretation of the 15-year impact of various climate change initiatives, this is only a small increase above the 0.9 percent number in the Energy Information Administration's Annual Energy Outlook. That assumption is not the most

optimistic outcome that might occur. Some authorities in the field of energy policy forecast more rapid technological progress. Experts at five national laboratories managed by the Department of Energy, using an engineering approach rather than an economic paradigm, found that a third of the emissions reductions necessary to return to 1990 levels by 2010 could be achieved through the adoption of existing energy-efficient technologies at no net resource cost, or even some savings. The National Academy of Sciences reached qualitatively similar conclusions in a 1992 report.

The President's FY 1999 budget, as I have noted, includes a \$6.3 billion package of tax cuts and R&D investments intended to spur the discovery and adoption of new technologies. If the Administration is successful in this effort, the rate of improvement in energy efficiency could rise and such improvements would lower the cost of meeting our Kyoto target. For example, published results based on SGM model simulations with different assumed rates of AEEI suggest that an increase in the AEEI of 25 percent could lead to declines in the permit price of approximately 40 percent.

Our justification for incorporating into our assessment a small assumed impact of Administration technology policies is somewhat analogous to the Administration's rationale for employing mainstream economic assumptions in our budget forecasts: in the presence of uncertainty, we are conservative in our estimates of the speed with which the economy will grow, tax receipts will rise, and the budget will improve. That way, any revisions or surprises that occur are likely to be in the pleasant direction. In this instance, we prudently and conservatively assume that there will be substantial delays between investments in new technology or the diffusion of existing technology, and the returns to such investments.

Moreover, at the recent automobile show in Detroit, General Motors announced that it has developed a hybrid-based vehicle that can achieve fuel efficiency of 80 miles per gallon, and that this car could be in commercial production within a few years. Ford also exhibited a prototype of a light-weight highly fuel efficient sedan that could be in commercial production by the middle of the next decade. These announcements followed an earlier breakthrough announced by DOE and its partners of a fuel cell that could run on gasoline and double current fuel economy while reducing conventional air pollution emissions by 90 percent. These technological advances have been made possible through the efforts of the Partnership for a New Generation of Vehicles between the Administration and the U.S. auto companies and their suppliers.

Such progress may be replicated in other sectors. VCRs and TVs, while switched off, consume about \$1 billion worth of electricity annually. EPA has established a partnership with major manufacturers that has a goal of achieving up to a 70 percent reduction in energy use by VCRs and TVs while they are switched off, without sacrificing product quality, usefulness, or increasing costs. This partnership offers promise of substantial improvements in energy efficiency.

Non-Climate Benefits

A final factor that should be included in any comprehensive assessment of the economic implications of the Kyoto protocol are the benefits of the agreement. The literature has emphasized that any relative price shifts that prove necessary to reduce emissions should produce non-climate benefits in three areas: traffic congestion, highway accidents, and air pollution unrelated to climate change. These benefits are hard to quantify precisely but are potentially significant: our rough estimates suggest that these three benefits could offset approximately a quarter of the resource cost of the climate change policy.

Synthesis

A comprehensive evaluation of the economic impact of the Kyoto Protocol must integrate all of the factors described above: reliance on flexible market-based mechanisms domestically; international trading and Joint Implementation among Annex I countries; the Clean Development Mechanism; meaningful developing country participation; the potential cost-mitigating role of including six gases and carbon sinks; the benefits of electricity restructuring; and emissions reductions achieved as a consequence of other proposed Administration climate change initiatives. Assuming that effective mechanisms for international trading, Joint Implementation and the Clean Development Mechanism are established, and assuming also that the U.S. achieves meaningful developing country participation, our overall assessment is that the economic cost to the United States in aggregate and to typical households of attaining the targets and timetables specified in the Kyoto Protocol, will be modest.

This conclusion that the impact will be modest is not entirely dependent upon, but is fully consistent with, formal model results. I have previously emphasized the limitations of relying on any single model in assessing the economic impact of the Kyoto Protocol, and continue to view any such results as just one input into an overall analysis. But it is worth emphasizing that model results reflecting the details of the Kyoto Protocol are consistent with our conclusion. For example, under the assumptions of either trading under the umbrella or within Annex I, the CDM and permit trading with developing countries, estimates derived using the SGM model, which adjust for the inclusion of six gases and assume little banking of credits beyond 2012, suggest that the resource costs of attaining the Kyoto targets for emission reductions might amount to \$7 to \$12 billion per year in 2008 to 2012. This implies that overall costs, excluding not only climate and non-climate benefits, but also such cost mitigating factors as sinks and payoffs from the President's electricity restructuring and climate change initiatives, would reach roughly one tenth of one percent of projected GDP in 2010.

A more tangible measure of costs is the estimated effects on energy prices. Excluding the impact of electricity restructuring and the ancillary benefits of mitigation and better forest management, the SGM-based estimate, corresponding to the gross resource cost estimate cited above, is an emissions price in the range of \$14 to \$23 per ton of carbon equivalent. This translates into an increase in energy prices between 2008 and 2012 at the household level of

between 3 and 5 percent, an increase in fuel oil prices of about 5 to 9 percent, natural gas prices of 3 to 5 percent, gasoline prices of 3 to 4 percent (or around 4 to 6 cents per gallon), and electricity prices of 3 to 4 percent. This increase in energy prices at the household level would raise the average household's energy bill in ten years by between \$70 and \$110 per year, although such predictions may not be observable because they would be small relative to typical energy price changes, and nearly fully offset by electricity price declines from Federal electricity restructuring. In particular, this increase in energy prices is small relative to the average of *year to year* real energy price changes experienced by U.S. consumers since 1960: such *annual* changes have averaged 3.8 percent. In addition, by 2008-2012, the anticipated 10 percent decline in electricity prices from the restructuring that is part of our climate change agenda is projected to lead to expenditure reductions of about \$90 per year for the average household.

As highlighted earlier, there are substantial but unavoidable uncertainties surrounding estimates like these. For example, the estimate just discussed is predicated, among other things, on the developing country participation that we are insisting upon as a condition for our ratifying the Kyoto Protocol, but which is not yet part of that Protocol, and on effective international trading. Moreover, other models will yield other answers and much work remains to be done by the modeling community to test the robustness of these results. Preliminary comparisons of the SGM model to the few other models that have attempted to evaluate the Kyoto accord, suggest that its predictions concerning the impact of the Kyoto Protocol on carbon permit prices are neither the most conservative nor the most optimistic of the models that have been developed. The predictions of the SGM model are robust in the sense that virtually all energy models reveal the potency of effective, flexible, domestic and international trading mechanisms to reduce substantially the cost and energy price impact of meeting the Kyoto targets.

Of course, the most important factor that has been left out of the above assessment is the benefit of mitigating climate change itself. A full cost-benefit analysis would include mitigation in the benefits column. The only reason we have not done so, explained repeatedly above, is the difficulty in coming up with a number to capture the monetary benefits. But nobody should lose sight of our ultimate objective -- keeping our planet the hospitable home that we enjoy today.

Effects on employment and aggregate output

So far we have said nothing about job losses resulting from climate change policy. Although there may be job gains in some sectors and job losses in others, we do not anticipate any significant aggregate employment effect if we achieve the conditions we have discussed. The effects on energy prices described above will occur only 10 to 14 years in the future. Not only are these effects small relative to historical variations in energy prices, and offset by other policies like electricity restructuring, they would occur sufficiently far in the future to enable monetary policy to keep the economy operating at its potential. In energy-intensive sectors some employment reduction could occur, although given the very small predicted change in energy prices, impacts in most such sectors are apt to be minimal. Furthermore, a large number of jobs will be created in other sectors -- many of them high-tech jobs paying high wages. The President is firmly committed to assisting any workers who are adversely affected during the transition to a climate-friendly economy.

VII. Conclusion

In conclusion, the Kyoto Protocol and the President's general approach to climate change reflect the insight of economic analysis. The Kyoto Protocol includes key provisions on international trading and Clean Development projects. The President's approach relies on market incentives -- first, with a system of tax cuts and R&D investments, and then later with a market-based system of tradeable permits -- to ensure that our objectives are achieved as efficiently as possible.

Our overall conclusion is that the economic impact of the Protocol will be modest under the conditions we have identified. The purpose of this testimony has been to explain the reasoning underlying this conclusion, which draws insights from not only the forecasts of individual models, any one of which has its own strengths and limitations, but also a broad variety of additional analyses.

I look forward to continuing to work with members of this Committee, as well as other interested parties, in further analyzing the Kyoto Protocol and evaluating the net effects of reducing greenhouse gas emissions. It is my hope that economic analysis will continue to play a key role in designing policies in this area.

I welcome your questions.