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DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
001. letter	To President Clinton from Japanese PM Hashimoto (4 pages)	09/27/1997	P1/b(1)
002. memo	To Sperling Climate Working Group from Timothy E. Wirth, re: Some Possible Momentum (4 pages)	10/07/1997	P1/b(1)

COLLECTION:
Clinton Presidential Records
Council of Economic Advisers
(Subject Files)
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FOLDER TITLE:
Climate Change #4 [2]

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RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P1 National Security Classified Information [(a)(1) of the PRA]
P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P3 Release would violate a Federal statute [(a)(3) of the PRA]
P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
P5 Release would disclose confidential advice between the President and his advisors, or between such advisors [a)(5) of the PRA]
P6 Release would constitute a clearly unwarranted invasion of personal privacy [(a)(6) of the PRA]

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PRM. Personal record misfile defined in accordance with 44 U.S.C. 2201(3).
RR. Document will be reviewed upon request.

Freedom of Information Act - [5 U.S.C. 552(b)]

b(1) National security classified information [(b)(1) of the FOIA]
b(2) Release would disclose internal personnel rules and practices of an agency [(b)(2) of the FOIA]
b(3) Release would violate a Federal statute [(b)(3) of the FOIA]
b(4) Release would disclose trade secrets or confidential or financial information [(b)(4) of the FOIA]
b(6) Release would constitute a clearly unwarranted invasion of personal privacy [(b)(6) of the FOIA]
b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

Questions and Answers on President's Climate Change Proposal
DRAFT -- 11:30 a.m. October 22, 1997

Q: **Don't economic models suggest that this effort will cost more than 1.5 million jobs and tank the economy?**

A: Some models may suggest that, but only by ignoring several key elements of the President's plan:

1. They ignore the President's $5 billion package of tax cuts and Federal R&D: To spur energy efficiency and the development of lower-carbon energy sources, the Administration supports a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

2. They ignore the potential for increased use of existing energy-efficient products: As the Department of Energy's 5-Labs study illustrates, many existing technologies produce win-win solutions to reducing carbon emissions -- but nonetheless are still not widely used. The President is committed to expanding their reach. The models referenced assume little change in the penetration rate of existing energy-efficient equipment.

3. They ignore the President's Federal energy initiative: To reduce greenhouse gas emissions from Federal sources, the Department of Energy will spearhead a comprehensive effort that includes expanded performance contracting to make Federal buildings more energy-efficient, improved Federal procurement practices, establishment of a new level of excellence for Federal building construction and renovation, and partnerships to improve the energy efficiency of Federal aircraft, ships and vehicles.

4. They ignore electricity restructuring: To spur further efforts to clean our air and deliver a down payment on greenhouse gas emission reductions, while saving consumers billions, we will pursue a bold plan to restructure the energy sector. It is time to change the rules that are often more than 70 years old -- stifling innovations that can save money and impede newer, cleaner technologies.

5. They ignore international emissions trading. Two key components of the President's plan are his support for an international system of emissions permit trading, and his commitment that developing countries must participate in the international effort. International trading can substantially reduce the costs of emissions reductions.

6. They ignore the economic costs associated with climate change itself. Climate change will lead to increased flooding, sea-level rise, and other dislocation. So looking just at the impact of reducing emissions on GDP is misleading.

Finally, we all must admit there is much uncertainty over cost projections that are a decade or more in the future -- after all, a decade ago, we could never have predicted that we would now have an unemployment rate below 5 percent, core inflation below 2.5 percent, and a budget deficit substantially under $50 billion. That's why the President has proposed a graduated, three-stage approach with regular reviews -- starting with a period of voluntary action, tax incentives, R&D, and Federal efficiency improvements, and followed by an evaluation period before the internationally binding period. Only after we have accumulated ten years of experience with the first two stages of the program would we enter the internationally binding period.

Q: **Didn't the 5-labs study conclude that carbon prices would have to rise by $50 to reach 1990 levels by 2010, and isn't that on the optimistic side?**

A: The 5-Labs study examined a scenario in which there was no international trading and no electricity restructuring legislation, and concluded that the permit price would have to be $50 to reduce emissions to 1990 levels by 2010 without such elements. But the President's plan emphasizes international trading and developing country participation, and includes a commitment to properly crafted electricity restructuring. [A DOE analysis that combines international permit trading and electricity restructuring with the results of the 5-Labs study suggests that a permit price of $25 or lower in 2010 would allow the country to meet its target and timetable.]

Q: **Doesn't the President's plan amount to the largest energy tax increase in history -- $200 billion a year or more?**

A: Not at all. The President's plan includes tax *cuts*, not tax increases. It does not involve tax increases at all.

Follow: but isn't a permit system just like a tax?

A: No. There are several critical differences between a permit system and a tax. [For example, a permit system provides insurance that a given quantitative target will be met, whereas a tax does not.] In any case, the permit system does not begin until we have accumulated ten years of experience with tax incentives, R&D, Federal energy efforts, early credit, and the other components of the President's initial action plan.

Q: **How can you possibly reduce emissions to 1990 levels by 2008-2012 without imposing excessive costs on the economy?**

A:
- The President believes that climate change is a critical challenge facing the country, and that if we make this a top priority, we can accomplish significant emissions reductions at low cost. In this effort, it would be irresponsible not to explore all possible avenues for low-cost emissions reductions. That's why the President has

proposed a graduated, three-stage approach -- starting with a period of early credit, tax incentives, R&D, and Federal efficiency improvements, and followed by an evaluation period around 2004. He has proposed regular economic reviews, to ensure that the economic costs are not excessive. Only after we have accumulated ten years of experience with the first two stages of the program would we enter the internationally binding period.

Q: Won't this plan lead to massive shifts of U.S. industry and jobs abroad?

A:

- No. The President has made very clear that we will not assume binding obligations without the participation of developing countries.

- I would also note that non-tradeable sectors account for a substantial share of carbon emissions. Transportation and buildings, for example, account for roughly two-thirds of U.S. emissions. For these sectors, the "competitiveness" argument seems largely irrelevant.

- In most manufacturing sectors, furthermore, energy costs are a small percentage of total costs. According to the 1995 Annual Census of Manufactures, energy costs for manufacturing industries averaged just 2.2 percent of total costs.

Q: How is the president's initial action plan different from the Climate Change Action Plan that the Administration has already adopted?

A: The first stage of the President's climate change proposal differs from the Climate Change Action Plan in four critical ways:

- It includes substantially more funding. The President's proposal includes funding for carbon-reducing activities of $5 billion over 5 years -- substantially more than current funding for the climate change action plan. Activities under the Climate Change Action Plan are estimated to reduce CO2 emissions by 95 million metric tons in 2010 -- and doubling the funding should lead to more reductions. [Total reductions needed in 2010 are 390 million metric tons.]

  [Funding for the Climate Change Action Plan in FY 1995 was $184 million, in FY 1996 $158 million, and in FY 1997 $163 million. Total funding for climate-related activities is somewhat higher -- but still less than $500 million per year -- because items such as PNGV are not included in the Climate Change Action Plan definition.]

- Crucially, the President's proposal now includes binding targets. In expectation of these binding targets, firms and households will begin to adjust their behavior today -- a factor that was not present in the climate change action plan.

- To provide further incentives for firms to take action now, the President has indicated his strong support for developing an early credit program of appropriate rewards for those who take prompt early action.

- Finally, the President has indicated his support for environmentally-friendly electricity restructuring, which has the potential to reduce emissions.

Q: Hasn't the climate change action plan failed to reduce emissions?

A: Total emissions are higher than anticipated when the Climate Change Action Plan was adopted several years ago, because of stronger economic growth, lower energy prices, and reduced funding for Congress. But the *partial* effect of the activities under the current Climate Change Action Plan is to still estimated to be a reduction in CO2 emissions of 32 million metric tons in 2000 and 95 million metric tons in 2010 (and *all* greenhouse gas emissions of 76 million metric tons in 2000 and 169 million metric tons in 2010). The President's three-stage plan includes substantially more funding than the Climate Change Action Plan -- and thus could produce substantially more reductions in carbon emissions. [390 million metric tons of CO2 reductions are needed in 2010 to move from business-as-usual to 1990 emissions levels.]

Q: Will you submit any agreement reached at Kyoto to the Senate for its advice and consent?

A:
- We honor and respect the U.S. Senate's important role in providing advice and consent to the ratification of treaties. We would anticipate the need for Senate advice and consent to any international agreement adopted in Kyoto that would impose binding commitments on the U.S. to control emissions.

Q: Will the President or Vice-President go to Kyoto?

A:
- We have not made final decisions about the membership of our delegation in Kyoto.

Q: What is the President proposing that developing countries do as part of his proposal?

A:
- Today, the President emphasized that the United States will not assume binding obligations under the climate treaty without developing country participation.

- The President believes we can engage developing countries on this issue in ways that are good for them and good for us. He believes that developing countries have an opportunity to chart a different energy future -- one based on clean and cheap technologies.

- The President spoke about this issue in each country he visited in Latin America last week. Throughout his trip, he shared his conviction that we can and must work together on this problem, in ways that benefit us all. He plans to raise this issue with Jiang Zemin next week.

Q: **Why did the U.S. propose such a modest target and timetable, which is weaker than any of the proposals to date, including from the European Union and Japan?**

A:
- The President has put forward a strong target that is realistic, achievable and pragmatic, not just rhetorical. We have backed up those proposals with a three-stage domestic implementation plan. And we have called for a comprehensive international framework that will ensure that all countries participate in a global effort to reduce emissions at the least cost.

- Keep in mind that some of these other targets aren't all they seem to be. The EU derives enormous benefits from a 1990 baseline -- Germany, for example, gets to claim credit for all the cheap reductions that were a fortuitous consequence of reunification.

- With regard to Japan, a careful examination of their proposal shows that we are not so far apart.

Q: **Isn't it true that this proposal doesn't actually reduce emissions at all but instead just stabilizes them at a certain level?**

A:
- No. Our proposal involves real and meaningful reductions. Consider that under a business-as-usual scenario, U.S. emissions are predicted to be 28% above 1990 levels by 2010.

- We also stipulate that further reductions, below the 1990 baseline, would be achieved in a second emissions budget period.

Q: **Given how far apart countries seem to be in their stated positions, is it realistic to expect any kind of agreement in Kyoto?**

A:
- We are hopeful that all countries will come to Kyoto with an open mind, prepared to negotiate an agreement that provides real and achievable gains.

- No agreement is better than a bad agreement. The U.S. will continue to insist that any international framework include realistic, achievable targets; flexible implementation mechanisms like emissions trading and joint implementation; and

the meaningful participation of developing countries.

Q: What happens if there is no deal in Kyoto?

A:

- We are hopeful that all countries will come to Kyoto with an open mind, prepared to negotiate an agreement that provides real and achievable gains.

- Even if we cannot reach agreement in Kyoto, climate change will remain a top priority issue for this President. The U.S. will continue to work on building support for a comprehensive international framework that involves all countries in a common effort to meet this important challenge.

- And we will get busy on the elements of the President's plan that we can start right away.

Q: Does the climate change science justify near-term action? Aren't the uncertainties still too great?

A:

- No. The fundamental science of climate change is clear. Greenhouse gas concentrations in the atmosphere are rising as a result of human actions. These increased concentrations are warming the planet, and unless we reduce our emissions, the effects on our climate are likely to become increasingly severe.

- Uncertainties do remain. We are not sure exactly how fast the planet will warm or which regions of the world will suffer the worst impacts. Yet what we do know is more than enough to justify taking the kinds of sensible actions the President has proposed.

- As for the skeptics who would have us do nothing, they represent a tiny fraction of the scientific community. On the other hand, the Intergovernmental Panel on Climate Change, including 2,000 of the world's premier climate experts, has underscored the seriousness of the climate change problem and the need for action.

- As part of his proposal, the President has called for additional scientific studies focused on key areas, including a call to the National Academy of Sciences to examine the issue of establishing a long-term goal for stabilizing atmospheric concentrations of greenhouse gases.

PRESIDENT CLINTON'S CLIMATE CHANGE PROPOSAL

October 22, 1997

Global climate change is the premier environmental challenge and opportunity of the 21st century, and the risks it poses justify sensible preventive steps. Addressing this issue is one of the United States' greatest imperatives, for this and future generations. Recognizing the solid foundation of climate science, President Clinton is committed to strong and sensible action to reduce greenhouse gas emissions -- including realistic and binding emissions targets.

Key elements of President Clinton's climate change proposal include:

- **Binding Targets to Reach 1990 Emissions Levels by 2008-2012 and Reductions Below 1990 Levels in the 5-Year Period That Follows.** A critical component of the President's comprehensive framework is a realistic, achievable, and binding target of reducing greenhouse emissions to 1990 levels by 2008-2012 and reductions below 1990 levels in the 5-year period that follows.

- **$5 Billion Program of Tax Cuts and R&D for New Technologies.** To spur energy efficiency and the development of new technologies, the President proposes a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

- **Industry-by-Industry Consultations and Early Credit.** The Administration challenges key industries to prepare plans over the next 9 months on how they can best reduce emissions. To provide an incentive for near-term actions to cut emissions, the President is committed to ensuring appropriate rewards for firms that act early.

- **Developing Countries Must Participate.** Climate change is a global problem, and requires a global solution. That's why the United States has spear-headed joint implementation projects, and the President has committed that the United States will not adopt binding obligations without developing country participation.

- **Broad-Based Domestic and International Emissions Trading System Begins After A Decade of Experience Has Accumulated.** The President is committed to a market-based emissions trading system, both domestically and internationally, that will harness the power of the market to reduce emissions to 1990 levels by 2008-2012. The trading system would begin after a decade's worth of experience with tax incentives, R&D, early credit, electricity restructuring, Federal efforts, and other measures.

BINDING TARGETS: The U.S. binding target is realistic: It seeks to return U.S. emissions to 1990 levels in the period 2008-2012 and reduce them further thereafter. We reject the European proposal for more stringent early reductions, as well as the "do-nothing" approach of some interests. The target is achievable: By providing incentives for early action to reduce emissions, attacking domestic energy inefficiencies, and putting in place a market-based emissions trading system, we can reach 1990 levels in the proposed time frame with minimal economic costs. And it is meaningful: Achieving 1990 levels in the period 2008-2012 would amount to almost a 30 percent reduction off a business-as-usual path, an important first step on the road toward stabilizing greenhouse gas concentrations in the atmosphere.

SOLID PRINCIPLES: The President's five climate change principles include: that the policies should be guided by science, rely on market-based, common-sense tools, that we should seek win-win solutions, that global participation is essential to addressing the global problem of climate change, and that we must have regular common-sense reviews of the economics and science of climate change.

SOUND AND SENSIBLE THREE-STAGE APPROACH: Reflecting his five key principles, the President's plan includes three stages: Stage 1 includes priming the pump through programs such as R&D, tax incentives, incentives for early action, and Federal leadership, and industry consultations. Stage 2 builds upon the first stage by including a review and evaluation in preparation for the permit trading system. Stage 3 -- which does not occur for a decade -- involves meeting binding targets through a domestic and international emissions trading program. The President is committed to working with labor and Congress to insure that we give proper assistance to any workers dislocated by the changes in energy usage inherent in any climate change plan.

INITIAL ACTION PLAN: The President's immediate action plan includes 9 elements:

1. $5 Billion in Tax Cuts and Federal R&D: To spur energy efficiency and encourage the development and deployment of lower-carbon energy sources, the Administration supports a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

2. Credit for Early Action: To provide an immediate incentive for near-term actions, the President is committed to ensuring that firms acting early are rewarded appropriately.

3. Industry-by-Industry Consultations: The Administration challenges key industry sectors to prepare plans over the next 9 months on how they can best reduce emissions.

4. Encouraging the Use of Energy-Efficient Products: The President will complement his tax incentives, commitment to early action credit, and industry consultations by engaging in a broad-based effort to expand the use of *existing* energy-efficient technologies.

5. Federal Procurement and Energy Use: The Department of Energy will spearhead a comprehensive effort to reduce greenhouse gas emissions from Federal sources.

6. Electricity Restructuring: To deliver a significant downpayment on emission reductions, while saving consumers billions, we will pursue a bold plan for electricity restructuring.

7. Setting a Concentration Goal: The United States supports developing a specific, long-term concentration goal with the assistance of the National Academy of Sciences and other bodies.

8. Bilateral Dialogues: In addition to pursuing agreement in Kyoto, the Administration will pursue bilateral dialogues with key developing countries to promote clean energy.

9. Economics and Science Reviews: The President proposes regular scientific and economic reviews. These reviews will ensure that policy-makers have the best possible information on climate change.

WIN-WIN: There are numerous win-win solutions to reducing carbon emissions. For example, a breakthrough in fuel cell technology announced yesterday will clear the way toward developing cars that are three times as efficient as today's models -- cutting pollution while also cutting driving costs.

INITIAL CLIMATE CHANGE ACTIONS

October 22, 1997

President Clinton has proposed nine immediate actions to begin addressing climate change:

1. Tax Cuts and Federal R&D: To spur energy efficiency and the development of lower-carbon energy sources, the Administration supports a major new package of tax cuts and R&D spending amounting to $5 billion over five years. Many of the ideas from the recent report of the President's Committee on Science and Technology (PCAST) will be considered in constructing this package.

2. Credit for Early Action: To provide an immediate incentive for near-term actions to cut emissions, the Administration is committed to ensuring that firms which act early are rewarded appropriately. We will work with companies to build a program that appropriately rewards those who take prompt and early actions before the beginning of the mandatory emissions budget period in Stage 3.

3. Industry-by-Industry Consultations: The Administration challenges key industry sectors to prepare plans over the next 9 months on how they can best reduce emissions, including how the Federal government can remove regulatory hurdles that discourage energy efficiency. The Administration will work in partnership with industry to develop sensible efficiency standards in a variety of areas.

4. Encouraging the Use of Energy-Efficient Products: As the Department of Energy's 5-Labs study illustrates, many existing technologies produce win-win solutions to reducing carbon emissions -- but nonetheless are still not widely used. The President is committed to expanding their reach. He will therefore complement his other programs by engaging in a broad-based effort to expand the use of *existing* energy-efficient technologies -- while also spurring the development of *new* technologies.

5. Federal Procurement and Energy Use: To reduce greenhouse gas emissions from Federal sources, DOE will spearhead a comprehensive effort that includes expanded performance contracting to make Federal buildings more energy-efficient, improved Federal procurement of energy-efficient technology, and partnerships to improve the energy efficiency of Federal aircraft, ships and vehicles. Federal agencies will also be called upon to assess emissions in major initiatives.

6. Electricity Restructuring: To spur further efforts to clean our air and deliver a downpayment on greenhouse gas emission reductions, while saving consumers billions, we will pursue a bold plan to restructure the energy sector. It is time to change the rules that are often more than 70 years old -- stifling innovations that can save money and impede newer, cleaner technologies.

7. Setting a Concentration Goal for Greenhouse Gases in the Atmosphere: The goal of the existing climate treaty is to stabilize concentrations of greenhouse gases, but the specific concentration has never been defined. The U.S. supports developing a specific, long-term goal, with the assistance of the National Academy of Science and other appropriate bodies.

8. Bilateral Dialogues: In addition to pursuing agreement in Kyoto, the Administration will pursue bilateral dialogues with key developing countries to promote clean energy.

9. Economics and Science Reviews: The President proposes regular scientific and economic reviews, to ensure that policy-makers have the best possible information on climate change.

BACKGROUND INFORMATION

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PRESIDENT CLINTON'S FIVE CLIMATE CHANGE PRINCIPLES

October 22, 1997

Global climate change is the premier environmental challenge and opportunity of the 21st century, and the risks it poses justify sensible preventive steps. Addressing this issue is one of the United States' greatest imperatives, for this and future generations. Recognizing the solid foundation of climate science, President Clinton is committed to strong and sensible action to reduce greenhouse gas emissions -- including realistic and binding emissions targets.

President Clinton's climate change plan is based on **five key principles:**

- **Guided by science.** The vast majority of the world's scientists have concluded that if the countries of world do not work together to cut greenhouse gas emissions, temperatures will rise and disrupt the global climate. Indeed, most scientists say this process has already begun. But there is much we still don't know about how the climate and human health will react to increased greenhouse gas concentrations. That's why the President's plan includes regular science reviews, to ensure that our policies are guided by the best science available.

- **Market-based, common-sense tools.** We have learned that the costs of protecting the environment is substantially lower if we harness the power of markets to do so. That's why the President's plan emphasizes flexible and market-based mechanisms. His plan includes a domestic and international permit trading system for greenhouse gas emissions, similar to the highly successful permit trading system that has dramatically cut acid rain at a fraction of the predicted cost.

- **Seek win-win solutions**. There are a multitude of win-win solutions to reducing carbon emissions, that can improve our energy efficiency and save consumers money. For example, a breakthrough in fuel cell technology announced yesterday will clear the way toward developing cars that are twice as efficient as today's models -- cutting pollution while also cutting driving costs. The President believes that we must seek such win-win solutions to addressing climate change.

- **Global participation**. Climate change is a global problem, and requires a global solution. A ton of carbon emitted in Argentina has just as much effect on the global climate as a ton of carbon emitted in the United States -- and within the next few decades, emissions from developing countries are expected to exceed those from developed countries. And many win-win opportunities exist to reduce greenhouse gas emissions in developing countries. That's why the United States has spear-headed joint implementation projects and the President has committed that the United States will not adopt binding obligations without developing country participation.

- **Common-sense economic reviews.** Our knowledge of the challenges and opportunities we face will grow over time. Therefore, the President is calling for regular 5-year economic reviews and updates, to ensure that policy-makers, both in the Administration and in Congress, have the best possible information on how the economy is responding to the effort to address climate change, how other countries are performing relative to their own commitments, and how the climate is changing in response to human activities.

THE PRESIDENT'S THREE-STAGE PLAN ON CLIMATE CHANGE
October 22, 1997

Reflecting his five key principles, the President's plan will proceed in three stages:

- **Stage 1: Priming the Pump Through R&D, Tax Incentives, Incentives for Early Action, Federal Leadership, and Industry Consultations.** The first stage of the President's package includes a 9-point action plan -- including $5 billion in tax incentives and spending for R&D and energy efficiency, incentives for early action, a set of Federal government energy initiatives, and industry-by-industry consultations to explore their best ideas on how to reduce emissions in a cost-effective manner (including market-oriented standards for energy efficiency). The first economic review would occur near the end of Stage 1.

- **Stage 2: Review and Evaluation.** The second stage, which would begin around 2004, will build upon the programs adopted in Stage 1, by including a review of our progress and an evaluation of next steps as we move toward a market-based permit trading system for carbon emissions. During this second stage, the details of the permit system would be refined and perhaps tested. Such a permit system is similar in concept to the one that dramatically cut acid rain emissions -- although the scale would be significantly larger than the current acid rain program. The second economic review would occur near the end of Stage 2.

- **Stage 3: Meeting Binding Targets Through Domestic and International Emissions Trading Program.** In the third stage, we would reduce emissions to 1990 levels by 2008-2012, and below 1990 levels in the 5-year period after that, through a market-based domestic and international emissions trading system. Before beginning this third stage, the second economic update and review would allow Congress and the President to evaluate how the economy had responded to a decade's worth of experience in the first two stages of the President's plan. The President is committed to working with labor and Congress to insure that we give proper assistance to any workers dislocated by the changes in energy usage inherent in any climate change plan.

This three-stage program recognizes the long-term nature of the effort to address climate change in three ways:

- By adopting a graduated approach to emissions reductions, it allows us to exploit the tremendous opportunities for win-win reductions first.

- By adopting a system of regular scientific and economic updates and reviews, it allows us to monitor our progress and re-assess our success in reducing emissions, the state of scientific knowledge, and how the economy is responding to our efforts. Only after we have accumulated ten years of experience with the first two stages of the program would we enter the internationally binding period.

- By insisting that the United States will not adopt binding obligations without developing country participation and by emphasizing the importance of an international trading system and joint implementation, we take advantage of low-cost reduction possibilities wherever they occur -- either here or abroad.

COMPREHENSIVE FRAMEWORK FOR EFFECTIVE, SENSIBLE ACTION

October 22, 1997

GREENHOUSE GAS EMISSION REDUCTION TARGET

Under the current international climate change agreement (signed in Rio de Janeiro in 1992), industrialized countries accepted a non-binding emissions reduction goal. Most nations, including the United States, will fall short of meeting it. This fact, coupled with better scientific evidence on the seriousness of the climate change threat, led the U.S. to propose last year that a new agreement set binding limits on emissions. The proposed U.S. emissions target is designed to provide important environmental gains while maintaining strong economic growth. It is:

- **Realistic.** Seeks to return U.S. emissions to 1990 levels in the period 2008-2012 and reduce them further thereafter. Rejects European proposal for more stringent early reductions, as well as the "do-nothing" approach of some interests.

- **Achievable.** By providing incentives for early action to reduce emissions, attacking domestic energy inefficiencies, securing flexible international implementation mechanisms, and putting in place a market-based domestic emissions trading system, the U.S. can reach 1990 levels in the proposed time frame with minimal economic costs.

- **Meaningful.** Achieving 1990 levels in the period 2008-2012 would amount to almost a 30 percent reduction off a business-as-usual path, an important first step on the road toward stabilizing concentrations of greenhouse gases in the atmosphere. Emissions accounting will include all greenhouse gas sources and sinks (including reforestation).

FLEXIBLE, MARKET-BASED IMPLEMENTATION

Just as the effects of climate change will be felt globally, so too are the causes of climate change global in nature. Greenhouse gas emissions do equal harm to the atmosphere whether they come from a coal plant in China or a bus in Boston. For this reason, any regime to reduce greenhouse gases must be global. It must also allow all nations the ability to seek out the most efficient way of reducing emissions so that the greatest gains are achieved at the least cost. For these reasons, the United States strongly supports the inclusion in a new climate change agreement of two innovative, flexible mechanisms for reducing emissions:

- **International Emissions Trading --Using Markets to Lower Costs.** The principle of emissions trading is to use the efficiency of the market place to achieve environmental objectives at the lowest possible cost. Under an international emissions trading regime, a country (or firm) would be able to meet its emissions reduction target by reducing pollution itself, purchasing reductions from another country (or firm) that was able to achieve excess gains, or some combination of both.

- **Joint Implementation --A Global Solution to Low-Cost Reductions.** Joint Implementation (JI) is an innovative, market-based approach for addressing global climate change that uses international partnerships to achieve low-cost reductions in greenhouse gas emissions. Under JI, a company in the United States invests in a project which reduces emissions in another country and uses those reductions as a less expensive means of meeting its own target.

PARTICIPATION OF DEVELOPING COUNTRIES

In addition to its non-binding emissions reduction aim for developed countries, the Rio climate change agreement required all countries to take policies and measures to reduce emissions. Many developing countries have made real strides, through, for example, reducing energy subsidies. Nevertheless, given that developing country emissions will eclipse those from the developed world within several decades, these countries need to do more. Accordingly, the U.S. calls on developing countries to strengthen their existing commitments and to agree that their obligations must increase over time to include binding emissions limits. Our principles include:

- **Global Participation.** All countries must participate. Every nation would be required to take meaningful actions to limit emissions. The U.S. will not assume binding obligations until developing countries agree to participate meaningfully in the challenge of addressing climate change.

- **Equity.** The obligations of poorer and less developed countries should take into account their state of economic development and their relative contribution to the climate change problem.

- **Assistance.** While insisting that developing countries take meaningful actions to address climate change, the U.S. recognizes that many of these countries face significant development challenges that hamper their ability to reduce emissions. President Clinton is reemphasizing his commitment to working with these nations to help build more sustainable energy futures. This includes a $1 billion package of assistance from USAID and a renewed commitment to provide financial assistance through the Global Environment Facility, as well as our pathbreaking joint implementation proposals.

FACT SHEET ON INTERNATIONAL EMISSIONS TRADING

October 22, 1997

Description

The principle of emissions trading is to use the efficiency of the market place to achieve environmental objectives at the lowest possible cost. Under an international emissions trading regime, a country (or firm) would be able to meet its emissions reduction target by reducing pollution itself, purchasing reductions from another country (or firm) that was able to achieve excess gains, or some combination of both.

Given an effective international regime, emissions trading provides a powerful incentive for nations to reduce below the amount required and then sell excess reductions to others who in turn avoid more costly actions. The U.S. has proposed that emissions trading be permitted among all countries that agree to a binding emissions target.

How it would work

Consider a simplified example for how international emissions trading might work. Country A and Country B must reduce emissions by 100 tons each. It might cost each country $1,000 to reduce 100 tons individually for a total cost of $2,000. However, if Country A could reduce its emissions by 200 tons for a total cost of $1,500 and sell half of these reductions to Country B, the overall target would be achieved for $500 less, a savings of 25 percent.

U.S. experience

Emissions trading is being used successfully at the domestic level to reduce sulfur dioxide emissions (which cause acid rain) under the Clean Air Act. Achieving targeted reductions was originally estimated to cost $5 billion annually if traditional controls had been required and $4 billion with emissions trading. A GAO estimate after the initial stage of emissions trading now puts the cost at $2 billion per year, or 60 percent below the original estimate with pollution reductions significantly ahead of schedule. Emissions trading has also been successful in cutting the costs of phasing out leaded gasoline and in curbing the production of chlorofluorocarbons which deplete the ozone layer.

Cost savings

According to the 1997 Economic Report of the President, international emissions trading for carbon dioxide could lower the cost of reductions by 50 percent below the minimum achievable using purely domestic programs.

FACT SHEET ON JOINT IMPLEMENTATION
October 22, 1997

Description

Joint Implementation (JI) is an innovative, market-based approach for addressing global climate change that uses international partnerships to achieve low-cost reductions in greenhouse gas emissions. Under JI, a company in the United States invests in a project which reduces emissions in another country and uses those reductions as a less expensive means of meeting its own target. The U.S. has proposed that a formal regime that gives credit for JI projects be part of a new climate change agreement.

How it would work

Consider the example of a project announced today as part of a pilot program on joint implementation instituted by the United States. Two U.S. companies (Solar Electric Power and Light of Washington, D.C. and Trexler and Associates, Inc of Oak Grove, Illionois) will work with Renewable Energy Services Company of Asia, Ltd. to market and install 812,000 solar home systems in Sri Lanka. These systems will replace the use of kerosene lamps for lighting and the use of diesel-electric charging of lead-acid batteries for powering small home appliances. The result will be a 1.5 million metric ton reduction in greenhouse gas emissions and cleaner energy for tens of thousands of people.

U.S. experience

Under the U.S. pilot program on JI (formed under the existing climate change convention), 28 projects have been approved in 12 countries, including Costa Rica, Bolivia, the Czech Republic, and Russia. These projects span a range of technologies, including solar, geothermal, and wind power; fuel switching for district heating; biomass energy; and reforestation. U.S. companies and organizations already participating include Commonwealth Edison, Wisconsin Electric Power, Kenetech Windpower, Sealweld Corp., American Electric Power, PacificCorp, Detroit Edison, Clean Air Coalition, and many others.

Benefits

Lower costs: JI provides a strong incentive for companies and countries to search the globe for the lowest cost ways of reducing greenhouse gas emissions.

Expanded exports of U.S. technology: The enormous potential for JI projects around the world creates major opportunities for the increased sale of U.S. energy efficiency and alternative energy technologies.

Technology transfer: Increased reliance on more energy efficient technologies and less carbon-intensive energy alternatives will help developing countries meet their growing energy needs with more environmentally sustainable solutions.

FACT SHEET ON FEDERAL ENERGY MANAGEMENT
October 22, 1997

Aggressive energy management can substantially reduce carbon emissions from the activities of the Federal government, which has the nation's largest energy bill at almost $8 billion per year. Significant strides have already been made --energy consumption per square foot in Federal buildings is down 15 percent and energy use in civilian and military vehicles is down about 27 percent from 1985 levels. However, we can do much more.

The initiatives below will reduce Federal emissions of greenhouse gases through enhanced focus on energy efficiency and renewable energy. They address areas which can deliver the greatest energy savings, best leverage private sector funding and improve the Federal procurement system.

1. Expand Energy Savings Performance Contracting

- Expand use of Energy Savings Performance Contracts. ESPC uses private investment capital and expertise to accomplish energy and cost saving projects in Federal facilities. When a private sector firm which has invested in federal energy efficiency improvements is fully repaid from its share of the delivered savings, all additional savings accrue to the government. Streamlined ESPC contracts put in place by DOD and DOE are beginning to speed large investments in energy projects at Federal facilities. However, use of ESPC's is still limited in the Federal government. The Office of Management and Budget will lead an effort to increase their use. It will include new policy and budget guidance for agencies. ESPC authority can also be extended to other areas including:

- *Leased Federal buildings.* These include buildings where the Government either pays for the energy use directly or in other building where ESPC can provide a better lease for the Government.

- *Federal mobility.* There may be great potential for energy savings from more efficient energy use in aircraft, ships and vehicles.

- *Water conservation.* Water conservation projects save energy because each gallon contains energy from pumping, heating, chilling or treatment.

- *Non-federal facilities* where the Government makes indirect payment of energy expenses. These include, for example, National Guard facilities which the state owns but where the Federal Government covers utility expenses and public housing facilities which are Federally supported but owned by public housing authorities.

- *State and local government facilities.* Federal energy experts can help transfer ESPC techniques to state and local governments so they can access this important approach to energy efficiency.

2. Improve Federal Procurement of Energy Efficient Technology

- *Accelerate the development of Product Energy Efficiency Recommendations.* These cover products that are in the top 25 percent of their class for energy efficiency or have Energy Star ratings, for example electric motors and air conditioning chillers. They provide a guide to Federal purchasers

FACT SHEET ON ELECTRICITY RESTRUCTURING
October 22, 1997

As part of his climate change initiative, President Clinton announced his support for appropriately crafted electricity restructuring legislation that will save consumers billions of dollars while reducing carbon emissions.

Description

The electricity sector is our nation's most capital intensive industry -- and has sales of over $200 billion. Under electricity restructuring, competition would be the primary mechanism to set electricity generation prices. Utilities would open up their distribution and transmission wires to all qualified sellers. The transmission and distribution of electricity would continue to be regulated because they will remain monopolies for the foreseeable future. The system would be restructured, not deregulated. Done correctly, this process can save consumers in their utility bills and reduce carbon emissions. A properly structured retail competition system can deliver electricity more efficiently, and just as reliably, as our present system of regulated monopolies.

Cost savings

Most experts are confident that restructuring will reduce the cost of electricity, although there is a diversity of views over the potential size of the savings. Because the industry is so large, even modest savings represent billions of dollars. DOE economists estimate potential savings of $20 billion a year, which would mean average direct savings of about $100 a year to a typical family of four and indirect savings to such a family through lower cost goods and services of about another $100 a year. Other studies predict far larger savings.

Carbon reductions

With appropriate market-based provisions, electricity restructuring legislation could reduce carbon emissions by creating incentives to produce and use electricity more efficiently and with less pollution. As emphasized at the White House Conference on Climate Change, two-thirds of the energy used to produce electricity is currently wasted. Restructuring should introduce incentives for reducing this waste heat. Restructuring legislation could also include other provisions -- such as various incentives and mandates to promote energy efficiency and renewable energy -- that offer potential carbon savings.

Next steps

The Administration looks forward to working with interested parties on crafting comprehensive electricity restructuring legislation.

of the energy efficiency level to request in a specification or procurement.

- *Establish as standard practice, the purchase of energy efficient products for Government use.* Traditionally, federal purchases have been based on lowest price, ignoring the substantial savings many energy efficient products can achieve over their life. The Executive Office of the President will lead an interagency team to streamline and update Executive Orders and procurement practices to encourage the acquisition of these products. Use of alternative contracting vehicles to acquire energy-efficient products will be encouraged, and purchase of products in the top 25 percent of class for energy efficiency or conforming to Energy Star standards will become standard practice, subject to necessary exceptions. The initiative will be augmented by publication of a "best practices" buying guide and expanded training of purchasing decision-makers.

- *Use consolidated purchasing to stimulate markets and lower prices.* Consolidated Federal purchasing can stimulate commercial markets for new and emerging products which offer greater energy efficiency, lower operating costs, and sales opportunities for small businesses that produce these products.

- *Increase Federal procurement of renewable energy.* In states that have implemented retail competition in their electricity industry, Federal facilities will work with their suppliers to ensure that the facilities purchase competitively supplied non-hydro renewable energy at levels equivalent to the percentage specified in that state's retail competition legislation.

- *Report Federal Agencies' Contributions to Reduction of Carbon Emissions.* This initiative will develop an appropriate measurement methodology to convert currently available data on Federal energy use to carbon emissions to aid national carbon reduction efforts.

3. Building for the 21st Century

- *Establish a new level of excellence for Federal building construction and renovation that incorporates energy efficiency, quality, affordability, and sustainability.* By using the latest construction techniques and tapping the knowledge of the building community and local partners, agencies will work to ensure that new Federal buildings achieve energy efficiency increases of 30-50 percent by 2000 as compared to existing facilities. This will be accomplished through a "whole building" approach that treats buildings as integrated systems rather than a series of independent component selections.

- *Deploy solar technologies in Federal buildings.* Show Federal leadership by installing solar photovoltaic and solar thermal systems on 20,000 Federal roofs by 2010 in support of the President's 'Million Solar Roof Initiative'. Utilize alternative financing methods to provide the rapid infusion of investment necessary to support the cost-effective installation of these systems.

- *Expand the use of combined heat and power generation at Federal facilities.* Combined heat and power makes greater use of the waste heat produced in the generation of electricity.

- *Use biomass fuels in Federal boilers.* Biomass would come from agricultural and wood waste and methane from landfill and treatment plant operations.

- *Expand public awareness of energy efficient technologies.* By showcasing energy efficient and

renewable energy technologies at National Parks, Federal offices, embassies, military bases, and other facilities the public will be more aware of their potential to reduce pollution and lower costs.

- *Seek increased resources for civilian agency staffing to expand energy management activities and complete energy efficiency projects.* In recent years, budgets for energy management in several key agencies have been cut by more than 80 percent. These Federal appropriations often provide the most cost-effective funding for Federal energy efficiency projects.

4. Improve Aircraft, Ship, and Heavy Vehicle Fuel Efficiency

- *Public-Private partnerships to improve the energy efficiency of Federal aircraft, ships and vehicles.* Energy use in Federal aircraft, ships and vehicles, predominantly in the military services, is responsible for 43 percent of the $8 billion Federal energy bill. This initiative would improve the energy efficiency of main propulsion systems, with particular emphasis on medium and heavy diesel engines and high performance turbine technology. The initiative -- designed along the lines of the Partnership for a New Generation of Vehicles -- would involve a partnership between Federal agencies and the private sector. Advances under this initiative will have significant application in commercial markets. In addition, the initiative will focus on near-term energy efficiency opportunities such as lighting retrofits on ships.

- *Increase the use of alternative fueled vehicles (AFVs) in the Federal fleet.* Federal agencies are increasing the use of alternative fuel vehicles which, among other things, helps reduce emissions of greenhouse gases. This initiative would enhance the focus of the current program on AFVs such as electrics, hybrid-electrics, natural gas and renewable-fueled vehicles.

5. Greenhouse Gas Assessments

- Federal agencies will be required to assess their greenhouse gas emissions in major actions they undertake.

FACT SHEET ON U.S. GLOBAL CHANGE RESEARCH PROGRAM

October 22, 1997

Background: The U.S. Global Change Research Program (USGCRP) is a National Research Program conducted under the auspices of the National Science and Technology Council (NSTC) Committee on Environment and Natural Resources. The NSTC is a cabinet-level council established by President Clinton in November 1993 to coordinate Federal science and technology efforts. The program's fundamental purpose is to increase understanding of the Earth system, and of human and naturally induced changes in the Earth's environment, and thus provide a sound scientific basis for decision making on global change issues. The USGCRP began as a Presidential Initiative, and was codified by the Global Change Research Act of 1990. The overall FY 1997 USGCRP budget was $1.81 billion.

The core program of the USGCRP is focused on four key scientific areas:

• *Seasonal to Interannual Climate Variability:* The development and refinement of forecasts of seasonal and interannual climate variability, including study and prediction of the El Niño phenomena.

• *Climate Change Over Decades to Centuries:* Analysis and projection of the effects of long-term climate change on natural resources, public health, and socio-economic sectors.

• *Changes in Ozone, UV Radiation, and Atmospheric Chemistry:* Research on the causes, rate, magnitude, and human health and ecological consequences of changes in stratospheric ozone, UV radiation, and atmospheric chemistry.

• *Changes in Land Cover and Terrestrial and Aquatic Ecosystems:* Research on the causes and consequences of land-cover changes, and on basic processes governing the functions and structure of terrestrial, aquatic, and marine ecosystems.

New Research Directions: Global change research is providing the information about the changing Earth system, and in particular, about climate change, that is needed to achieve a sustainable future. New research efforts include:

• *A National Assessment of Climate Change Impacts* to aggregate information across regions and sectors, analyze national-scale consequences, and support development of mitigation and adaptation strategies.

• *Improved Regional-scale Analyses*, including regional estimates of the rate and magnitude of climate change, analyses of the environmental and socio-economic consequences of climate change in the context of other stresses, and integrated assessments of the implications for society and the environment of climate change.

• *Regional Workshops* to examine the vulnerabilities of various regions of the United States to climate change.

FACT SHEET ON PNGV
October 22, 1997

Announced at the White House on September 29, 1993 by President Clinton, Vice President Gore, and the CEOs of the domestic auto makers, the Partnership for a New Generation of Vehicles (PNGV) is a partnership between the U.S. Federal government (7 agencies and 20 federal laboratories) and Chrysler, Ford, and General Motors that aims to strengthen America's competitiveness by developing technologies for a new generation of vehicles. Its programs include research support for over 350 automotive suppliers, universities, and small businesses.

PNGV's long-term goal is to develop production prototypes of an attractive, affordable car that can meet all applicable environmental and safety times and achieve up to three times the fuel efficiency of a comparable automobile sold today. This would mean that a typical midsize car would be able to achieve 80 mpg. The partnership also aims to (i) improve automotive manufacturing, and (ii) introduce efficiency technologies into production vehicles as soon as they are economically justified.

There are numerous reasons for pursuing PNGV, including:

- **Environmental:** Automobiles are a major contributor to atmospheric carbon dioxide, a major greenhouse gas. Already, concentrations of carbon dioxide are 25 percent higher than pre-industrial levels and are expected to double within the next century. Since the number of registered vehicles in the United States is expected to climb from 194 million in 1993, to as many as 270 million in 2010, PNGV's success is critical to any program of controlling US and world greenhouse gas emissions. It will also result in low cost methods for controlling the emissions that contribute to urban air pollution.

- **Reducing U.S. Dependence on Foreign Oil**: The United States currently imports 50 percent of the oil we consume -- this share is expected to grow to more than 60 percent by 2010. Petroleum imports make up ten percent of our country's import inventory and account for a large chunk of the nation's trade deficit. This dependence on foreign oil makes the United States vulnerable.

PNGV Status Report: The industrial partners are now in the process of selecting technologies that will be included in concept vehicles that will be completed by the turn of the century. The federal agencies are working to revise their research priorities to support both technologies that can be incorporated in production prototypes for 2004 and that can be integrated into even more advanced vehicles that would be designed in later years.

The goal of the program, while extremely ambitious, still seems possible given the advances in key technology that have been achieved during the life of the program. These include advances in production of low-cost, light-weight materials for the vehicle body and frame; electrical control systems, batteries; and compact, inexpensive fuel cells -- including the new technology for using gasoline to power fuel cells announced yesterday; and, advanced internal combustion engines for use in hybrid vehicles.

FACT SHEET ON FUEL CELLS
October 22, 1997

THE BREAKTHROUGH: A gasoline-powered technology that would allow you to double the fuel efficiency of a car and emit half the greenhouse gases and virtually no other air pollution. For the first time, gasoline was used to produce electricity from a pollution-free fuel cell, allowing the use of the existing gasoline infrastructure. Previously, fuel cells have been powered by hydrogen or methanol, which are less convenient for use in cars.

The Department of Energy, together with Los Alamos National Laboratory, and A.D. Little, have developed a breakthrough fuel processor, which can extract hydrogen from gasoline and other fuels such as ethanol and natural gas. Last week, this fuel processor was combined with a fuel cell from Plug Power to demonstrate for the first time that a fuel cell electric car could be fueled by gasoline or ethanol. This eliminates the limited driving range and lengthy recharging times associated with electric cars that run on batteries.

WHAT IS A FUEL CELL: The fuel cell converts the chemical energy of a fuel directly into usable electricity and heat without combustion. Fuel cells are similar to batteries in that both produce a direct current by means of an electrochemical process, but fuel cells can operate indefinitely as long as fuel is supplied to them. Fuel cells can provide power for cars and other applications, such as electricity and hot water for buildings.

The Department of Energy working with its partners has brought down the cost of proton exchange membrane (PEM) fuel cells by a factor of twenty in the last ten years. Continued R&D, coupled with the economies of scale from mass production of fuel cells as they enter the marketplace, should allow us to maintain this pace of cost reduction for another decade.

PARTNERSHIP FOR A NEW GENERATION OF VEHICLES (PNGV): The fuel cell breakthrough was accomplished as part of President Clinton's PNGV initiative, an innovative partnership between the government, the national laboratories, the big three automakers, and their suppliers. PNGV's goal is to develop a family-sized vehicle with triple the fuel efficiency of today's cars, without compromising cost or convenience.

POTENTIAL GREENHOUSE GAS REDUCTIONS: One-third of the nation's carbon dioxide emissions comes from the transportation sector, primarily cars. Fuel cell technology alone can directly double fuel efficiency and cut carbon dioxide emissions in half. In combination with other PNGV advances, such as lightweight materials and regenerative breaking, fuel cells will allow a tripling of fuel efficiency and a further reduction in greenhouse gas emissions. Powering the fuel cell with renewable fuels, such as ethanol, could eliminate automotive greenhouse gas emissions entirely in the long run. The buildings sector also generates one-third of the nation's emissions of carbon dioxide. A building that uses the electricity and hot water from a fuel cell fueled by natural gas would have about half of the greenhouse gas emissions of the average building today. Plug Power expects to introduce fuel cells for homes and other buildings in 2000 that will provide electricity for less than the current residential rate. By 2010, fuel cells in buildings could be providing emissions savings of five million metric tons of carbon.

FACT SHEET ON PATH
October 22, 1997

What is PATH? We are working to develop a partnership for 21st century housing bringing together government and industry to develop, demonstrate and deploy housing technologies, designs and practices that can significantly improve the quality of housing without raising the cost of construction. The **Partnership for Advancing Technologies in Housing** includes government (DOE, HUD, EPA, Labor, Commerce, FEMA, and DOD) and industry working together develop, demonstrate and deploy housing technologies and practices so that homes can be built cheaper, more environmentally sustainable, more disaster resistant, and provide a safer working environment.

PATH has a five-part approach:
- Industry-driven research on new technologies and practices
- Working with industry on pilot programs building thousands of marketable houses
- Streamlining of federal, state and local codes and regulations
- Judicious use of existing authority on standards
- Information campaign to influence consumer demand

R&D: Support more funds for accelerated research and demonstration of inexpensive, highly efficient, highly attractive housing. Link with million solar roofs program.

Standards: The success of PATH will in some part be based on utilizing existing authorities on standards for a select few products that have the potential for great savings. There are five appliance/products currently under review by DoE; Clothes Washers, Ranges/Ovens, Ballasts, Residential water heaters, transformers. Of these, the Clothes Washers and Water Heaters seem to have greatest potential.

Creating Markets: The key to making the Partnership successful will be the ability to create markets and consumer demands for homes that meet the PATH goals. The Partnership will work with states and communities to help them understand the benefits of building these homes, and the opportunities it affords the communities for economic growth. The Partnership will attempt to gain agreements between communities that PATH homes can go through an expedited permitting process.

Education and Outreach: Marketing the benefits of these homes to consumers and to encourage consumers to begin to ask for homes that are built to the quality level of >PATH= homes. This will need to be an intensive campaign of getting the message out to communities, builders and developers. This will provide incentives for more and more builders to want to build these homes.

Pilots: The pilots will play an important role in the success of PATH. The pilot sites will begin of developing the markets and demonstrate the feasibility of the homes. The pilot sites can also act as training sites for builders and community leaders to learn about the benefits of the technologies and as a classroom for training on how to use the technologies. Sites under consideration are Stapleton Airport, Denver (Redevelopment of old airport site near downtown) and Florida (Working with the State to link energy and environment to disaster resistance and affordability).

Regulatory Streamlining: Working with states and communities on making the code approval process more efficient and less time consuming.

FACT SHEET ON POTENTIAL INDUSTRY SECTOR SAVINGS

October 22, 1997

The industrial sector produces approximately one-third of total U.S. emissions. We can cut emissions substantially in this sector through the right mix of tax incentives, accelerated research and development, electricity restructuring, and environmental regulatory reinvention. According to a recently released report from five of the nation's energy laboratories, programs such as the ones below can reduce emissions in the industrial sector in 2010 by 28 million metric tons even with no increase in energy prices.

Increasing Energy Efficiency: Energy audits encourage systematic approaches to energy efficiency that typically have high yields. Southwire Corporation, a large manufacturer of wire, rod, and cable, cut their use of natural gas by 60 percent and cut electricity use by 40 percent per pound of product produced. Motors consume 70 percent of industrial electricity used, and there is room for improving their efficiency. The Greenville Tube Company, for example, increased productivity by 15 percent, increased energy efficiency by 30 percent, reduced scrap by 15 percent, and achieved $77,000 per year savings -- a 6 month payback -- by improving the efficiency of their motors.

Cogeneration (Combined Heat and Power): New technologies available in the industrial sector will allow us to capture the waste heat the U.S. now throws away. With the right policies, industrial cogeneration of natural gas or biomass could cut annual carbon emission significantly by 2010. Advanced turbines developed by DOE with industry will be available in three years (orders are already being taken). They have an overall efficiency of 80 percent to 90 percent, produce steam together with low-cost electricity and significantly reduce NOx emissions. These turbines can run on natural gas or biomass. Some industries have their own low-cost biomass feedstocks (for example, black liquor gasification in the pulp and paper industry), which makes possible cogeneration with nearly zero carbon emissions.

Expanding Industries of the Future: The seven most energy-intensive industries—steel, aluminum, petroleum refining, chemicals, pulp and paper products, glass, and metal casting—account for about 80 percent of the carbon emissions in U.S. manufacturing and more than 90 percent of the hazardous waste. Industry, partnering with the Department of Energy, has developed long-term visions of energy-efficient, low-polluting, highly competitive "Industries of the Future" as well as technology roadmaps to identify an R&D and deployment pathway to achieving the vision. Visions typically foresee annual energy efficiency improvements of 1.0 percent to 1.5 percent for two decades.

FACT SHEET ON POTENTIAL BUILDINGS SECTOR SAVINGS

October 22, 1997

The buildings sector also produces approximately one-third of total U.S. emissions. There is substantial opportunity to improve the energy efficiency of our buildings and the appliances in them. Many of these technologies improve the quality of service delivered (i.e. higher quality lighting), and have also been documented in a number of cases to improve productivity. According to a recently released report from five of the nation's energy laboratories, programs such as the ones below can reduce emissions in the buildings sector in 2010 by 25 million metric tons even with no increase in energy prices.

Standards: Substantial carbon emissions reductions in 2010 can be achieved through existing authority of the Department of Energy to establish market-oriented efficiency standards for appliances, such as refrigerators and air conditioners. The Department of Energy uses a consensus-based approach in which manufacturers, environmentalists, consumer advocates, and the states work together to develop applicable standards.

Voluntary Programs: Significant carbon reductions in 2010 could also be achieved by expanding voluntary programs such as the joint EPA–DOE Energy Star program. Energy Star labeling has already transformed a number of markets. For example, it has cut the energy used by computers, monitors, and printers by 50 percent at virtually no incremental cost. It is now being extended to dozens of other products.

Adopting Best Electricity Engineering Practices: Electronic equipment consumes electricity in stand-by mode (even when not being used) generating 12 MMTs of carbon emission each year. Preliminary analysis suggests that 80 percent of that could be saved through adopting best engineering practices without reducing service.

Research and Development: Designing buildings with advanced technology can reduce energy consumption by 25 to 50 percent without increasing the building's initial cost. The extra cost of some of the energy-efficient equipment is offset by the smaller required heating and cooling system.

Combined Heat and Power: As in industry, we can reduce the carbon intensity of the buildings sector by accelerating the use of combined heat and power (CHP). Two CHP technologies—small turbines and proton-exchange membrane (PEM) fuel cells—can convert natural gas to useful energy with 80 to 90 percent efficiency, significantly cutting carbon emissions from a building.

FACT SHEET ON POTENTIAL TRANSPORTATION SECTOR SAVINGS

October 22, 1997

The transportation sector produces approximately one-third of total U.S. emissions. According to a recently released report from five of the nation's energy laboratories, programs such as the ones below can reduce emissions in the transportation sector in 2010 by 73 million metric tons even with no increase in energy prices.

High Efficiency Cars And Light Trucks: The goal of the President's Partnership for a New Generation of Vehicles is to produce cars that are three times more efficient than current vehicles with no compromise in size, safety, comfort or cost. The objective is a production prototype vehicle with a fuel efficiency of 80 mpg in 2004 and commercial availability soon after. A variety of efficient technologies such as hybrid vehicle design, advanced engines, regenerative braking and lightweight materials are under development. These technologies are also applicable to light trucks and sport utility vehicles, so that a PNGV for these heavier passenger vehicles is quite possible with an expanded research effort.

High efficiency heavy trucks: Ongoing federal R&D on advanced diesel engines and lightweight materials have the potential to substantially reduce carbon emissions from heavy trucks. These technologies are projected to be available by about 2003 and be quickly adopted by trucking manufacturers since energy is a major cost component of freight transportation (a truck typically gets 7 to 8 miles per gallon while traveling over 50,000 miles a year).

Advanced Efficient Aircraft and Rail: Ongoing federal R&D on advanced aircraft engines, improved airframes, and air traffic control have the potential to improve aircraft energy efficiency by 35 percent, with an additional increment of carbon emissions reductions achieved by increasing the efficiency of trains.

Low-Carbon Fuel: Government-industry R&D partnerships have brought the cost of ethanol from cellulosic waste (such as crop waste) and dedicated crops (such as switchgrass) from $3.60 per gallon in 1980 to $1.20 per gallon today. Such fuels are carbon neutral because the crops capture carbon dioxide when they grow and release it during combustion.

Talking Points on President's Climate Change Proposal
October 22, 1997

The President has proposed an ambitious climate change plan that is environmentally strong and economically sensible. Based on the President's conviction that global climate change is the premier environmental challenge of the 21st century, the President's plan will proceed pragmatically -- in three stages and with periodic economic and scientific reviews -- to cut greenhouse gas emissions by almost 30% from levels projected for 2010.

In the first stage, the President's plan will provide funding, create incentives, build partnerships and give credit for early emissions reductions. The second phase, beginning around 2004, will review, evaluate and extend the efforts of the first phase while laying the groundwork for phase three. In phase three, an international and domestic emissions trading system would begin.

The President's plan includes the following key elements:

- **A binding, realistic target to reach 1990 emissions levels by 2008-2012.** This target is part of a comprehensive framework for agreement in Kyoto that also includes flexible, market-based mechanisms and the participation of developing countries. The President is also committed to reductions below 1990 levels in the five-year period that follows.

- **A $5 billion program of tax cuts and R&D for new technologies.** To spur energy efficiency and the development of new technologies, the President proposes a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

- **Active consultations over the next 9 months on an industry-by-industry basis, with early credit for companies making early reductions.** The President is committed to working with business to get their best ideas on how they can best reduce their own emissions, and to rewarding firms that act early.

- **Developing countries must participate.** Climate change is a global problem, and requires a global solution. That's why the President has committed that the United States will not adopt binding obligations without developing country participation.

- **A domestic and international emissions trading system.** Such a system can harness the power of the market to reduce emissions, as it has with great success in the case of acid rain.

- **Encouraging the use of energy-efficient products.** The President will engage in a broad-based effort to expand the use of existing energy-efficient technologies.

- **Federal procurement and energy use.** The Department of Energy will spearhead a comprehensive effort to reduce greenhouse gas emissions from Federal sources.

- **Electricity Restructuring.** To deliver a significant down payment on emission reductions, while saving consumers billions, we will pursue a bold plan for electricity restructuring.

- **Setting a concentration goal.** With advice from the National Academy of Sciences, the U.S. supports developing a specific, long-term concentration goal for greenhouse gases in the atmosphere.

- **Transition assistance.** The President is committed to working with Congress and labor to ensure a just transition for any workers dislocated by the changes in energy usage inherent in any climate change plan.

Questions and Answers on President's Climate Change Proposal
DRAFT -- 11:30 a.m. October 22, 1997

Q: **Don't economic models suggest that this effort will cost more than 1.5 million jobs and tank the economy?**

A: Some models may suggest that, but only by ignoring several key elements of the President's plan:

1. They ignore the President's $5 billion package of tax cuts and Federal R&D: To spur energy efficiency and the development of lower-carbon energy sources, the Administration supports a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

2. They ignore the potential for increased use of existing energy-efficient products: As the Department of Energy's 5-Labs study illustrates, many existing technologies produce win-win solutions to reducing carbon emissions -- but nonetheless are still not widely used. The President is committed to expanding their reach. The models referenced assume little change in the penetration rate of existing energy-efficient equipment.

3. They ignore the President's Federal energy initiative: To reduce greenhouse gas emissions from Federal sources, the Department of Energy will spearhead a comprehensive effort that includes expanded performance contracting to make Federal buildings more energy-efficient, improved Federal procurement practices, establishment of a new level of excellence for Federal building construction and renovation, and partnerships to improve the energy efficiency of Federal aircraft, ships and vehicles.

4. They ignore electricity restructuring: To spur further efforts to clean our air and deliver a down payment on greenhouse gas emission reductions, while saving consumers billions, we will pursue a bold plan to restructure the energy sector. It is time to change the rules that are often more than 70 years old -- stifling innovations that can save money and impede newer, cleaner technologies.

5. They ignore international emissions trading. Two key components of the President's plan are his support for an international system of emissions permit trading, and his commitment that developing countries must participate in the international effort. International trading can substantially reduce the costs of emissions reductions.

6. They ignore the economic costs associated with climate change itself. Climate change will lead to increased flooding, sea-level rise, and other dislocation. So looking just at the impact of reducing emissions on GDP is misleading.

Finally, we all must admit there is much uncertainty over cost projections that are a decade or more in the future -- after all, a decade ago, we could never have predicted that we would now have an unemployment rate below 5 percent, core inflation below 2.5 percent, and a budget deficit substantially under $50 billion. That's why the President has proposed a graduated, three-stage approach with regular reviews -- starting with a period of voluntary action, tax incentives, R&D, and Federal efficiency improvements, and followed by an evaluation period before the internationally binding period. Only after we have accumulated ten years of experience with the first two stages of the program would we enter the internationally binding period.

Q: **Didn't the 5-labs study conclude that carbon prices would have to rise by $50 to reach 1990 levels by 2010, and isn't that on the optimistic side?**

A: The 5-Labs study examined a scenario in which there was no international trading and no electricity restructuring legislation, and concluded that the permit price would have to be $50 to reduce emissions to 1990 levels by 2010 without such elements. But the President's plan emphasizes international trading and developing country participation, and includes a commitment to properly crafted electricity restructuring. [A DOE analysis that combines international permit trading and electricity restructuring with the results of the 5-Labs study suggests that a permit price of $25 or lower in 2010 would allow the country to meet its target and timetable.]

Q: **Doesn't the President's plan amount to the largest energy tax increase in history -- $200 billion a year or more?**

A: Not at all. The President's plan includes tax *cuts*, not tax increases. It does not involve tax increases at all.

Follow: but isn't a permit system just like a tax?

A: No. There are several critical differences between a permit system and a tax. [For example, a permit system provides insurance that a given quantitative target will be met, whereas a tax does not.] In any case, the permit system does not begin until we have accumulated ten years of experience with tax incentives, R&D, Federal energy efforts, early credit, and the other components of the President's initial action plan.

Q: **How can you possibly reduce emissions to 1990 levels by 2008-2012 without imposing excessive costs on the economy?**

A:
- The President believes that climate change is a critical challenge facing the country, and that if we make this a top priority, we can accomplish significant emissions reductions at low cost. In this effort, it would be irresponsible not to explore all possible avenues for low-cost emissions reductions. That's why the President has

proposed a graduated, three-stage approach -- starting with a period of early credit, tax incentives, R&D, and Federal efficiency improvements, and followed by an evaluation period around 2004. He has proposed regular economic reviews, to ensure that the economic costs are not excessive. Only after we have accumulated ten years of experience with the first two stages of the program would we enter the internationally binding period.

Q: Won't this plan lead to massive shifts of U.S. industry and jobs abroad?

A:

- No. The President has made very clear that we will not assume binding obligations without the participation of developing countries.

- I would also note that non-tradeable sectors account for a substantial share of carbon emissions. Transportation and buildings, for example, account for roughly two-thirds of U.S. emissions. For these sectors, the "competitiveness" argument seems largely irrelevant.

- In most manufacturing sectors, furthermore, energy costs are a small percentage of total costs. According to the 1995 Annual Census of Manufactures, energy costs for manufacturing industries averaged just 2.2 percent of total costs.

Q: How is the president's initial action plan different from the Climate Change Action Plan that the Administration has already adopted?

A: The first stage of the President's climate change proposal differs from the Climate Change Action Plan in four critical ways:

- It includes substantially more funding. The President's proposal includes funding for carbon-reducing activities of $5 billion over 5 years -- substantially more than current funding for the climate change action plan. Activities under the Climate Change Action Plan are estimated to reduce CO2 emissions by 95 million metric tons in 2010 -- and doubling the funding should lead to more reductions. [Total reductions needed in 2010 are 390 million metric tons.]

  [Funding for the Climate Change Action Plan in FY 1995 was $184 million, in FY 1996 $158 million, and in FY 1997 $163 million. Total funding for climate-related activities is somewhat higher -- but still less than $500 million per year -- because items such as PNGV are not included in the Climate Change Action Plan definition.]

- Crucially, the President's proposal now includes binding targets. In expectation of these binding targets, firms and households will begin to adjust their behavior today -- a factor that was not present in the climate change action plan.

- To provide further incentives for firms to take action now, the President has indicated his strong support for developing an early credit program of appropriate rewards for those who take prompt early action.

- Finally, the President has indicated his support for environmentally-friendly electricity restructuring, which has the potential to reduce emissions.

Q: Hasn't the climate change action plan failed to reduce emissions?

A: Total emissions are higher than anticipated when the Climate Change Action Plan was adopted several years ago, because of stronger economic growth, lower energy prices, and reduced funding for Congress. But the *partial* effect of the activities under the current Climate Change Action Plan is to still estimated to be a reduction in CO2 emissions of 32 million metric tons in 2000 and 95 million metric tons in 2010 (and *all* greenhouse gas emissions of 76 million metric tons in 2000 and 169 million metric tons in 2010). The President's three-stage plan includes substantially more funding than the Climate Change Action Plan -- and thus could produce substantially more reductions in carbon emissions. [390 million metric tons of CO2 reductions are needed in 2010 to move from business-as-usual to 1990 emissions levels.]

Q: Will you submit any agreement reached at Kyoto to the Senate for its advice and consent?

A:
- We honor and respect the U.S. Senate's important role in providing advice and consent to the ratification of treaties. We would anticipate the need for Senate advice and consent to any international agreement adopted in Kyoto that would impose binding commitments on the U.S. to control emissions.

Q: Will the President or Vice-President go to Kyoto?

A:
- We have not made final decisions about the membership of our delegation in Kyoto.

Q: What is the President proposing that developing countries do as part of his proposal?

A:
- Today, the President emphasized that the United States will not assume binding obligations under the climate treaty without developing country participation.

- The President believes we can engage developing countries on this issue in ways that are good for them and good for us. He believes that developing countries have an opportunity to chart a different energy future -- one based on clean and cheap technologies.

- The President spoke about this issue in each country he visited in Latin America last week. Throughout his trip, he shared his conviction that we can and must work together on this problem, in ways that benefit us all. He plans to raise this issue with Jiang Zemin next week.

Q: **Why did the U.S. propose such a modest target and timetable, which is weaker than any of the proposals to date, including from the European Union and Japan?**

A:
- The President has put forward a strong target that is realistic, achievable and pragmatic, not just rhetorical. We have backed up those proposals with a three-stage domestic implementation plan. And we have called for a comprehensive international framework that will ensure that all countries participate in a global effort to reduce emissions at the least cost.

- Keep in mind that some of these other targets aren't all they seem to be. The EU derives enormous benefits from a 1990 baseline -- Germany, for example, gets to claim credit for all the cheap reductions that were a fortuitous consequence of reunification.

- With regard to Japan, a careful examination of their proposal shows that we are not so far apart.

Q: **Isn't it true that this proposal doesn't actually reduce emissions at all but instead just stabilizes them at a certain level?**

A:
- No. Our proposal involves real and meaningful reductions. Consider that under a business-as-usual scenario, U.S. emissions are predicted to be 28% above 1990 levels by 2010.

- We also stipulate that further reductions, below the 1990 baseline, would be achieved in a second emissions budget period.

Q: **Given how far apart countries seem to be in their stated positions, is it realistic to expect any kind of agreement in Kyoto?**

A:
- We are hopeful that all countries will come to Kyoto with an open mind, prepared to negotiate an agreement that provides real and achievable gains.

- No agreement is better than a bad agreement. The U.S. will continue to insist that any international framework include realistic, achievable targets; flexible implementation mechanisms like emissions trading and joint implementation; and

the meaningful participation of developing countries.

Q: What happens if there is no deal in Kyoto?

A:

- We are hopeful that all countries will come to Kyoto with an open mind, prepared to negotiate an agreement that provides real and achievable gains.

- Even if we cannot reach agreement in Kyoto, climate change will remain a top priority issue for this President. The U.S. will continue to work on building support for a comprehensive international framework that involves all countries in a common effort to meet this important challenge.

- And we will get busy on the elements of the President's plan that we can start right away.

Q: Does the climate change science justify near-term action? Aren't the uncertainties still too great?

A:

- No. The fundamental science of climate change is clear. Greenhouse gas concentrations in the atmosphere are rising as a result of human actions. These increased concentrations are warming the planet, and unless we reduce our emissions, the effects on our climate are likely to become increasingly severe.

- Uncertainties do remain. We are not sure exactly how fast the planet will warm or which regions of the world will suffer the worst impacts. Yet what we do know is more than enough to justify taking the kinds of sensible actions the President has proposed.

- As for the skeptics who would have us do nothing, they represent a tiny fraction of the scientific community. On the other hand, the Intergovernmental Panel on Climate Change, including 2,000 of the world's premier climate experts, has underscored the seriousness of the climate change problem and the need for action.

- As part of his proposal, the President has called for additional scientific studies focused on key areas, including a call to the National Academy of Sciences to examine the issue of establishing a long-term goal for stabilizing atmospheric concentrations of greenhouse gases.

PRESIDENT CLINTON'S CLIMATE CHANGE PROPOSAL

October 22, 1997

Global climate change is the premier environmental challenge and opportunity of the 21st century, and the risks it poses justify sensible preventive steps. Addressing this issue is one of the United States' greatest imperatives, for this and future generations. Recognizing the solid foundation of climate science, President Clinton is committed to strong and sensible action to reduce greenhouse gas emissions -- including realistic and binding emissions targets.

Key elements of President Clinton's climate change proposal include:

- **Binding Targets to Reach 1990 Emissions Levels by 2008-2012 and Reductions Below 1990 Levels in the 5-Year Period That Follows.** A critical component of the President's comprehensive framework is a realistic, achievable, and binding target of reducing greenhouse emissions to 1990 levels by 2008-2012 and reductions below 1990 levels in the 5-year period that follows.

- **$5 Billion Program of Tax Cuts and R&D for New Technologies.** To spur energy efficiency and the development of new technologies, the President proposes a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

- **Industry-by-Industry Consultations and Early Credit.** The Administration challenges key industries to prepare plans over the next 9 months on how they can best reduce emissions. To provide an incentive for near-term actions to cut emissions, the President is committed to ensuring appropriate rewards for firms that act early.

- **Developing Countries Must Participate.** Climate change is a global problem, and requires a global solution. That's why the United States has spear-headed joint implementation projects, and the President has committed that the United States will not adopt binding obligations without developing country participation.

- **Broad-Based Domestic and International Emissions Trading System Begins After A Decade of Experience Has Accumulated.** The President is committed to a market-based emissions trading system, both domestically and internationally, that will harness the power of the market to reduce emissions to 1990 levels by 2008-2012. The trading system would begin after a decade's worth of experience with tax incentives, R&D, early credit, electricity restructuring, Federal efforts, and other measures.

BINDING TARGETS: The U.S. binding target is realistic: It seeks to return U.S. emissions to 1990 levels in the period 2008-2012 and reduce them further thereafter. We reject the European proposal for more stringent early reductions, as well as the "do-nothing" approach of some interests. The target is achievable: By providing incentives for early action to reduce emissions, attacking domestic energy inefficiencies, and putting in place a market-based emissions trading system, we can reach 1990 levels in the proposed time frame with minimal economic costs. And it is meaningful: Achieving 1990 levels in the period 2008-2012 would amount to almost a 30 percent reduction off a business-as-usual path, an important first step on the road toward stabilizing greenhouse gas concentrations in the atmosphere.

SOLID PRINCIPLES: The President's five climate change principles include: that the policies should be guided by science, rely on market-based, common-sense tools, that we should seek win-win solutions, that global participation is essential to addressing the global problem of climate change, and that we must have regular common-sense reviews of the economics and science of climate change.

SOUND AND SENSIBLE THREE-STAGE APPROACH: Reflecting his five key principles, the President's plan includes three stages: Stage 1 includes priming the pump through programs such as R&D, tax incentives, incentives for early action, and Federal leadership, and industry consultations. Stage 2 builds upon the first stage by including a review and evaluation in preparation for the permit trading system. Stage 3 -- which does not occur for a decade -- involves meeting binding targets through a domestic and international emissions trading program. The President is committed to working with labor and Congress to insure that we give proper assistance to any workers dislocated by the changes in energy usage inherent in any climate change plan.

INITIAL ACTION PLAN: The President's immediate action plan includes 9 elements:

1. $5 Billion in Tax Cuts and Federal R&D: To spur energy efficiency and encourage the development and deployment of lower-carbon energy sources, the Administration supports a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

2. Credit for Early Action: To provide an immediate incentive for near-term actions, the President is committed to ensuring that firms acting early are rewarded appropriately.

3. Industry-by-Industry Consultations: The Administration challenges key industry sectors to prepare plans over the next 9 months on how they can best reduce emissions.

4. Encouraging the Use of Energy-Efficient Products: The President will complement his tax incentives, commitment to early action credit, and industry consultations by engaging in a broad-based effort to expand the use of *existing* energy-efficient technologies.

5. Federal Procurement and Energy Use: The Department of Energy will spearhead a comprehensive effort to reduce greenhouse gas emissions from Federal sources.

6. Electricity Restructuring: To deliver a significant downpayment on emission reductions, while saving consumers billions, we will pursue a bold plan for electricity restructuring.

7. Setting a Concentration Goal: The United States supports developing a specific, long-term concentration goal with the assistance of the National Academy of Sciences and other bodies.

8. Bilateral Dialogues: In addition to pursuing agreement in Kyoto, the Administration will pursue bilateral dialogues with key developing countries to promote clean energy.

9. Economics and Science Reviews: The President proposes regular scientific and economic reviews. These reviews will ensure that policy-makers have the best possible information on climate change.

WIN-WIN: There are numerous win-win solutions to reducing carbon emissions. For example, a breakthrough in fuel cell technology announced yesterday will clear the way toward developing cars that are three times as efficient as today's models -- cutting pollution while also cutting driving costs.

INITIAL CLIMATE CHANGE ACTIONS

October 22, 1997

President Clinton has proposed nine immediate actions to begin addressing climate change:

1. Tax Cuts and Federal R&D: To spur energy efficiency and the development of lower-carbon energy sources, the Administration supports a major new package of tax cuts and R&D spending amounting to $5 billion over five years. Many of the ideas from the recent report of the President's Committee on Science and Technology (PCAST) will be considered in constructing this package.

2. Credit for Early Action: To provide an immediate incentive for near-term actions to cut emissions, the Administration is committed to ensuring that firms which act early are rewarded appropriately. We will work with companies to build a program that appropriately rewards those who take prompt and early actions before the beginning of the mandatory emissions budget period in Stage 3.

3. Industry-by-Industry Consultations: The Administration challenges key industry sectors to prepare plans over the next 9 months on how they can best reduce emissions, including how the Federal government can remove regulatory hurdles that discourage energy efficiency. The Administration will work in partnership with industry to develop sensible efficiency standards in a variety of areas.

4. Encouraging the Use of Energy-Efficient Products: As the Department of Energy's 5-Labs study illustrates, many existing technologies produce win-win solutions to reducing carbon emissions -- but nonetheless are still not widely used. The President is committed to expanding their reach. He will therefore complement his other programs by engaging in a broad-based effort to expand the use of *existing* energy-efficient technologies -- while also spurring the development of *new* technologies.

5. Federal Procurement and Energy Use: To reduce greenhouse gas emissions from Federal sources, DOE will spearhead a comprehensive effort that includes expanded performance contracting to make Federal buildings more energy-efficient, improved Federal procurement of energy-efficient technology, and partnerships to improve the energy efficiency of Federal aircraft, ships and vehicles. Federal agencies will also be called upon to assess emissions in major initiatives.

6. Electricity Restructuring: To spur further efforts to clean our air and deliver a downpayment on greenhouse gas emission reductions, while saving consumers billions, we will pursue a bold plan to restructure the energy sector. It is time to change the rules that are often more than 70 years old -- stifling innovations that can save money and impede newer, cleaner technologies.

7. Setting a Concentration Goal for Greenhouse Gases in the Atmosphere: The goal of the existing climate treaty is to stabilize concentrations of greenhouse gases, but the specific concentration has never been defined. The U.S. supports developing a specific, long-term goal, with the assistance of the National Academy of Science and other appropriate bodies.

8. Bilateral Dialogues: In addition to pursuing agreement in Kyoto, the Administration will pursue bilateral dialogues with key developing countries to promote clean energy.

9. Economics and Science Reviews: The President proposes regular scientific and economic reviews, to ensure that policy-makers have the best possible information on climate change.

BACKGROUND INFORMATION

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PRESIDENT CLINTON'S FIVE CLIMATE CHANGE PRINCIPLES

October 22, 1997

Global climate change is the premier environmental challenge and opportunity of the 21st century, and the risks it poses justify sensible preventive steps. Addressing this issue is one of the United States' greatest imperatives, for this and future generations. Recognizing the solid foundation of climate science, President Clinton is committed to strong and sensible action to reduce greenhouse gas emissions -- including realistic and binding emissions targets.

President Clinton's climate change plan is based on **five key principles:**

- **Guided by science.** The vast majority of the world's scientists have concluded that if the countries of world do not work together to cut greenhouse gas emissions, temperatures will rise and disrupt the global climate. Indeed, most scientists say this process has already begun. But there is much we still don't know about how the climate and human health will react to increased greenhouse gas concentrations. That's why the President's plan includes regular science reviews, to ensure that our policies are guided by the best science available.

- **Market-based, common-sense tools.** We have learned that the costs of protecting the environment is substantially lower if we harness the power of markets to do so. That's why the President's plan emphasizes flexible and market-based mechanisms. His plan includes a domestic and international permit trading system for greenhouse gas emissions, similar to the highly successful permit trading system that has dramatically cut acid rain at a fraction of the predicted cost.

- **Seek win-win solutions**. There are a multitude of win-win solutions to reducing carbon emissions, that can improve our energy efficiency and save consumers money. For example, a breakthrough in fuel cell technology announced yesterday will clear the way toward developing cars that are twice as efficient as today's models -- cutting pollution while also cutting driving costs. The President believes that we must seek such win-win solutions to addressing climate change.

- **Global participation**. Climate change is a global problem, and requires a global solution. A ton of carbon emitted in Argentina has just as much effect on the global climate as a ton of carbon emitted in the United States -- and within the next few decades, emissions from developing countries are expected to exceed those from developed countries. And many win-win opportunities exist to reduce greenhouse gas emissions in developing countries. That's why the United States has spear-headed joint implementation projects and the President has committed that the United States will not adopt binding obligations without developing country participation.

- **Common-sense economic reviews.** Our knowledge of the challenges and opportunities we face will grow over time. Therefore, the President is calling for regular 5-year economic reviews and updates, to ensure that policy-makers, both in the Administration and in Congress, have the best possible information on how the economy is responding to the effort to address climate change, how other countries are performing relative to their own commitments, and how the climate is changing in response to human activities.

THE PRESIDENT'S THREE-STAGE PLAN ON CLIMATE CHANGE

October 22, 1997

Reflecting his five key principles, the President's plan will proceed in three stages:

- **Stage 1: Priming the Pump Through R&D, Tax Incentives, Incentives for Early Action, Federal Leadership, and Industry Consultations.** The first stage of the President's package includes a 9-point action plan -- including $5 billion in tax incentives and spending for R&D and energy efficiency, incentives for early action, a set of Federal government energy initiatives, and industry-by-industry consultations to explore their best ideas on how to reduce emissions in a cost-effective manner (including market-oriented standards for energy efficiency). The first economic review would occur near the end of Stage 1.

- **Stage 2: Review and Evaluation.** The second stage, which would begin around 2004, will build upon the programs adopted in Stage 1, by including a review of our progress and an evaluation of next steps as we move toward a market-based permit trading system for carbon emissions. During this second stage, the details of the permit system would be refined and perhaps tested. Such a permit system is similar in concept to the one that dramatically cut acid rain emissions -- although the scale would be significantly larger than the current acid rain program. The second economic review would occur near the end of Stage 2.

- **Stage 3: Meeting Binding Targets Through Domestic and International Emissions Trading Program.** In the third stage, we would reduce emissions to 1990 levels by 2008-2012, and below 1990 levels in the 5-year period after that, through a market-based domestic and international emissions trading system. Before beginning this third stage, the second economic update and review would allow Congress and the President to evaluate how the economy had responded to a decade's worth of experience in the first two stages of the President's plan. The President is committed to working with labor and Congress to insure that we give proper assistance to any workers dislocated by the changes in energy usage inherent in any climate change plan.

This three-stage program recognizes the long-term nature of the effort to address climate change in three ways:

- By adopting a graduated approach to emissions reductions, it allows us to exploit the tremendous opportunities for win-win reductions first.

- By adopting a system of regular scientific and economic updates and reviews, it allows us to monitor our progress and re-assess our success in reducing emissions, the state of scientific knowledge, and how the economy is responding to our efforts. Only after we have accumulated ten years of experience with the first two stages of the program would we enter the internationally binding period.

- By insisting that the United States will not adopt binding obligations without developing country participation and by emphasizing the importance of an international trading system and joint implementation, we take advantage of low-cost reduction possibilities wherever they occur -- either here or abroad.

COMPREHENSIVE FRAMEWORK FOR EFFECTIVE, SENSIBLE ACTION

October 22, 1997

GREENHOUSE GAS EMISSION REDUCTION TARGET

Under the current international climate change agreement (signed in Rio de Janeiro in 1992), industrialized countries accepted a non-binding emissions reduction goal. Most nations, including the United States, will fall short of meeting it. This fact, coupled with better scientific evidence on the seriousness of the climate change threat, led the U.S. to propose last year that a new agreement set binding limits on emissions. The proposed U.S. emissions target is designed to provide important environmental gains while maintaining strong economic growth. It is:

- **Realistic.** Seeks to return U.S. emissions to 1990 levels in the period 2008-2012 and reduce them further thereafter. Rejects European proposal for more stringent early reductions, as well as the "do-nothing" approach of some interests.

- **Achievable.** By providing incentives for early action to reduce emissions, attacking domestic energy inefficiencies, securing flexible international implementation mechanisms, and putting in place a market-based domestic emissions trading system, the U.S. can reach 1990 levels in the proposed time frame with minimal economic costs.

- **Meaningful.** Achieving 1990 levels in the period 2008-2012 would amount to almost a 30 percent reduction off a business-as-usual path, an important first step on the road toward stabilizing concentrations of greenhouse gases in the atmosphere. Emissions accounting will include all greenhouse gas sources and sinks (including reforestation).

FLEXIBLE, MARKET-BASED IMPLEMENTATION

Just as the effects of climate change will be felt globally, so too are the causes of climate change global in nature. Greenhouse gas emissions do equal harm to the atmosphere whether they come from a coal plant in China or a bus in Boston. For this reason, any regime to reduce greenhouse gases must be global. It must also allow all nations the ability to seek out the most efficient way of reducing emissions so that the greatest gains are achieved at the least cost. For these reasons, the United States strongly supports the inclusion in a new climate change agreement of two innovative, flexible mechanisms for reducing emissions:

- **International Emissions Trading --Using Markets to Lower Costs.** The principle of emissions trading is to use the efficiency of the market place to achieve environmental objectives at the lowest possible cost. Under an international emissions trading regime, a country (or firm) would be able to meet its emissions reduction target by reducing pollution itself, purchasing reductions from another country (or firm) that was able to achieve excess gains, or some combination of both.

- **Joint Implementation --A Global Solution to Low-Cost Reductions.** Joint Implementation (JI) is an innovative, market-based approach for addressing global climate change that uses international partnerships to achieve low-cost reductions in greenhouse gas emissions. Under JI, a company in the United States invests in a project which reduces emissions in another country and uses those reductions as a less expensive means of meeting its own target.

PARTICIPATION OF DEVELOPING COUNTRIES

In addition to its non-binding emissions reduction aim for developed countries, the Rio climate change agreement required all countries to take policies and measures to reduce emissions. Many developing countries have made real strides, through, for example, reducing energy subsidies. Nevertheless, given that developing country emissions will eclipse those from the developed world within several decades, these countries need to do more. Accordingly, the U.S. calls on developing countries to strengthen their existing commitments and to agree that their obligations must increase over time to include binding emissions limits. Our principles include:

- **Global Participation.** All countries must participate. Every nation would be required to take meaningful actions to limit emissions. The U.S. will not assume binding obligations until developing countries agree to participate meaningfully in the challenge of addressing climate change.

- **Equity.** The obligations of poorer and less developed countries should take into account their state of economic development and their relative contribution to the climate change problem.

- **Assistance.** While insisting that developing countries take meaningful actions to address climate change, the U.S. recognizes that many of these countries face significant development challenges that hamper their ability to reduce emissions. President Clinton is reemphasizing his commitment to working with these nations to help build more sustainable energy futures. This includes a $1 billion package of assistance from USAID and a renewed commitment to provide financial assistance through the Global Environment Facility, as well as our pathbreaking joint implementation proposals.

FACT SHEET ON INTERNATIONAL EMISSIONS TRADING

October 22, 1997

Description

The principle of emissions trading is to use the efficiency of the market place to achieve environmental objectives at the lowest possible cost. Under an international emissions trading regime, a country (or firm) would be able to meet its emissions reduction target by reducing pollution itself, purchasing reductions from another country (or firm) that was able to achieve excess gains, or some combination of both.

Given an effective international regime, emissions trading provides a powerful incentive for nations to reduce below the amount required and then sell excess reductions to others who in turn avoid more costly actions. The U.S. has proposed that emissions trading be permitted among all countries that agree to a binding emissions target.

How it would work

Consider a simplified example for how international emissions trading might work. Country A and Country B must reduce emissions by 100 tons each. It might cost each country $1,000 to reduce 100 tons individually for a total cost of $2,000. However, if Country A could reduce its emissions by 200 tons for a total cost of $1,500 and sell half of these reductions to Country B, the overall target would be achieved for $500 less, a savings of 25 percent.

U.S. experience

Emissions trading is being used successfully at the domestic level to reduce sulfur dioxide emissions (which cause acid rain) under the Clean Air Act. Achieving targeted reductions was originally estimated to cost $5 billion annually if traditional controls had been required and $4 billion with emissions trading. A GAO estimate after the initial stage of emissions trading now puts the cost at $2 billion per year, or 60 percent below the original estimate with pollution reductions significantly ahead of schedule. Emissions trading has also been successful in cutting the costs of phasing out leaded gasoline and in curbing the production of chlorofluorocarbons which deplete the ozone layer.

Cost savings

According to the 1997 Economic Report of the President, international emissions trading for carbon dioxide could lower the cost of reductions by 50 percent below the minimum achievable using purely domestic programs.

FACT SHEET ON JOINT IMPLEMENTATION
October 22, 1997

Description

Joint Implementation (JI) is an innovative, market-based approach for addressing global climate change that uses international partnerships to achieve low-cost reductions in greenhouse gas emissions. Under JI, a company in the United States invests in a project which reduces emissions in another country and uses those reductions as a less expensive means of meeting its own target. The U.S. has proposed that a formal regime that gives credit for JI projects be part of a new climate change agreement.

How it would work

Consider the example of a project announced today as part of a pilot program on joint implementation instituted by the United States. Two U.S. companies (Solar Electric Power and Light of Washington, D.C. and Trexler and Associates, Inc of Oak Grove, Illionois) will work with Renewable Energy Services Company of Asia, Ltd. to market and install 812,000 solar home systems in Sri Lanka. These systems will replace the use of kerosene lamps for lighting and the use of diesel-electric charging of lead-acid batteries for powering small home appliances. The result will be a 1.5 million metric ton reduction in greenhouse gas emissions and cleaner energy for tens of thousands of people.

U.S. experience

Under the U.S. pilot program on JI (formed under the existing climate change convention), 28 projects have been approved in 12 countries, including Costa Rica, Bolivia, the Czech Republic, and Russia. These projects span a range of technologies, including solar, geothermal, and wind power; fuel switching for district heating; biomass energy; and reforestation. U.S. companies and organizations already participating include Commonwealth Edison, Wisconsin Electric Power, Kenetech Windpower, Sealweld Corp., American Electric Power, PacificCorp, Detroit Edison, Clean Air Coalition, and many others.

Benefits

Lower costs: JI provides a strong incentive for companies and countries to search the globe for the lowest cost ways of reducing greenhouse gas emissions.

Expanded exports of U.S. technology: The enormous potential for JI projects around the world creates major opportunities for the increased sale of U.S. energy efficiency and alternative energy technologies.

Technology transfer: Increased reliance on more energy efficient technologies and less carbon-intensive energy alternatives will help developing countries meet their growing energy needs with more environmentally sustainable solutions.

FACT SHEET ON FEDERAL ENERGY MANAGEMENT
October 22, 1997

Aggressive energy management can substantially reduce carbon emissions from the activities of the Federal government, which has the nation's largest energy bill at almost $8 billion per year. Significant strides have already been made --energy consumption per square foot in Federal buildings is down 15 percent and energy use in civilian and military vehicles is down about 27 percent from 1985 levels. However, we can do much more.

The initiatives below will reduce Federal emissions of greenhouse gases through enhanced focus on energy efficiency and renewable energy. They address areas which can deliver the greatest energy savings, best leverage private sector funding and improve the Federal procurement system.

1. Expand Energy Savings Performance Contracting

- Expand use of Energy Savings Performance Contracts. ESPC uses private investment capital and expertise to accomplish energy and cost saving projects in Federal facilities. When a private sector firm which has invested in federal energy efficiency improvements is fully repaid from its share of the delivered savings, all additional savings accrue to the government. Streamlined ESPC contracts put in place by DOD and DOE are beginning to speed large investments in energy projects at Federal facilities. However, use of ESPC's is still limited in the Federal government. The Office of Management and Budget will lead an effort to increase their use. It will include new policy and budget guidance for agencies. ESPC authority can also be extended to other areas including:

- *Leased Federal buildings.* These include buildings where the Government either pays for the energy use directly or in other building where ESPC can provide a better lease for the Government.

- *Federal mobility.* There may be great potential for energy savings from more efficient energy use in aircraft, ships and vehicles.

- *Water conservation.* Water conservation projects save energy because each gallon contains energy from pumping, heating, chilling or treatment.

- *Non-federal facilities* where the Government makes indirect payment of energy expenses. These include, for example, National Guard facilities which the state owns but where the Federal Government covers utility expenses and public housing facilities which are Federally supported but owned by public housing authorities.

- *State and local government facilities.* Federal energy experts can help transfer ESPC techniques to state and local governments so they can access this important approach to energy efficiency.

2. Improve Federal Procurement of Energy Efficient Technology

- *Accelerate the development of Product Energy Efficiency Recommendations.* These cover products that are in the top 25 percent of their class for energy efficiency or have Energy Star ratings, for example electric motors and air conditioning chillers. They provide a guide to Federal purchasers

FACT SHEET ON ELECTRICITY RESTRUCTURING
October 22, 1997

As part of his climate change initiative, President Clinton announced his support for appropriately crafted electricity restructuring legislation that will save consumers billions of dollars while reducing carbon emissions.

Description

The electricity sector is our nation's most capital intensive industry -- and has sales of over $200 billion. Under electricity restructuring, competition would be the primary mechanism to set electricity generation prices. Utilities would open up their distribution and transmission wires to all qualified sellers. The transmission and distribution of electricity would continue to be regulated because they will remain monopolies for the foreseeable future. The system would be restructured, not deregulated. Done correctly, this process can save consumers in their utility bills and reduce carbon emissions. A properly structured retail competition system can deliver electricity more efficiently, and just as reliably, as our present system of regulated monopolies.

Cost savings

Most experts are confident that restructuring will reduce the cost of electricity, although there is a diversity of views over the potential size of the savings. Because the industry is so large, even modest savings represent billions of dollars. DOE economists estimate potential savings of $20 billion a year, which would mean average direct savings of about $100 a year to a typical family of four and indirect savings to such a family through lower cost goods and services of about another $100 a year. Other studies predict far larger savings.

Carbon reductions

With appropriate market-based provisions, electricity restructuring legislation could reduce carbon emissions by creating incentives to produce and use electricity more efficiently and with less pollution. As emphasized at the White House Conference on Climate Change, two-thirds of the energy used to produce electricity is currently wasted. Restructuring should introduce incentives for reducing this waste heat. Restructuring legislation could also include other provisions -- such as various incentives and mandates to promote energy efficiency and renewable energy -- that offer potential carbon savings.

Next steps

The Administration looks forward to working with interested parties on crafting comprehensive electricity restructuring legislation.

of the energy efficiency level to request in a specification or procurement.

- *Establish as standard practice, the purchase of energy efficient products for Government use.* Traditionally, federal purchases have been based on lowest price, ignoring the substantial savings many energy efficient products can achieve over their life. The Executive Office of the President will lead an interagency team to streamline and update Executive Orders and procurement practices to encourage the acquisition of these products. Use of alternative contracting vehicles to acquire energy-efficient products will be encouraged, and purchase of products in the top 25 percent of class for energy efficiency or conforming to Energy Star standards will become standard practice, subject to necessary exceptions. The initiative will be augmented by publication of a "best practices" buying guide and expanded training of purchasing decision-makers.

- *Use consolidated purchasing to stimulate markets and lower prices.* Consolidated Federal purchasing can stimulate commercial markets for new and emerging products which offer greater energy efficiency, lower operating costs, and sales opportunities for small businesses that produce these products.

- *Increase Federal procurement of renewable energy.* In states that have implemented retail competition in their electricity industry, Federal facilities will work with their suppliers to ensure that the facilities purchase competitively supplied non-hydro renewable energy at levels equivalent to the percentage specified in that state's retail competition legislation.

- *Report Federal Agencies' Contributions to Reduction of Carbon Emissions.* This initiative will develop an appropriate measurement methodology to convert currently available data on Federal energy use to carbon emissions to aid national carbon reduction efforts.

3. Building for the 21st Century

- *Establish a new level of excellence for Federal building construction and renovation that incorporates energy efficiency, quality, affordability, and sustainability.* By using the latest construction techniques and tapping the knowledge of the building community and local partners, agencies will work to ensure that new Federal buildings achieve energy efficiency increases of 30-50 percent by 2000 as compared to existing facilities. This will be accomplished through a "whole building" approach that treats buildings as integrated systems rather than a series of independent component selections.

- *Deploy solar technologies in Federal buildings.* Show Federal leadership by installing solar photovoltaic and solar thermal systems on 20,000 Federal roofs by 2010 in support of the President's 'Million Solar Roof Initiative'. Utilize alternative financing methods to provide the rapid infusion of investment necessary to support the cost-effective installation of these systems.

- *Expand the use of combined heat and power generation at Federal facilities.* Combined heat and power makes greater use of the waste heat produced in the generation of electricity.

- *Use biomass fuels in Federal boilers.* Biomass would come from agricultural and wood waste and methane from landfill and treatment plant operations.

- *Expand public awareness of energy efficient technologies.* By showcasing energy efficient and

renewable energy technologies at National Parks, Federal offices, embassies, military bases, and other facilities the public will be more aware of their potential to reduce pollution and lower costs.

- *Seek increased resources for civilian agency staffing to expand energy management activities and complete energy efficiency projects.* In recent years, budgets for energy management in several key agencies have been cut by more than 80 percent. These Federal appropriations often provide the most cost-effective funding for Federal energy efficiency projects.

4. Improve Aircraft, Ship, and Heavy Vehicle Fuel Efficiency

- *Public-Private partnerships to improve the energy efficiency of Federal aircraft, ships and vehicles.* Energy use in Federal aircraft, ships and vehicles, predominantly in the military services, is responsible for 43 percent of the $8 billion Federal energy bill. This initiative would improve the energy efficiency of main propulsion systems, with particular emphasis on medium and heavy diesel engines and high performance turbine technology. The initiative -- designed along the lines of the Partnership for a New Generation of Vehicles -- would involve a partnership between Federal agencies and the private sector. Advances under this initiative will have significant application in commercial markets. In addition, the initiative will focus on near-term energy efficiency opportunities such as lighting retrofits on ships.

- *Increase the use of alternative fueled vehicles (AFVs) in the Federal fleet.* Federal agencies are increasing the use of alternative fuel vehicles which, among other things, helps reduce emissions of greenhouse gases. This initiative would enhance the focus of the current program on AFVs such as electrics, hybrid-electrics, natural gas and renewable-fueled vehicles.

5. Greenhouse Gas Assessments

- Federal agencies will be required to assess their greenhouse gas emissions in major actions they undertake.

FACT SHEET ON U.S. GLOBAL CHANGE RESEARCH PROGRAM

October 22, 1997

Background: The U.S. Global Change Research Program (USGCRP) is a National Research Program conducted under the auspices of the National Science and Technology Council (NSTC) Committee on Environment and Natural Resources. The NSTC is a cabinet-level council established by President Clinton in November 1993 to coordinate Federal science and technology efforts. The program's fundamental purpose is to increase understanding of the Earth system, and of human and naturally induced changes in the Earth's environment, and thus provide a sound scientific basis for decision making on global change issues. The USGCRP began as a Presidential Initiative, and was codified by the Global Change Research Act of 1990. The overall FY 1997 USGCRP budget was $1.81 billion.

The core program of the USGCRP is focused on four key scientific areas:

• *Seasonal to Interannual Climate Variability:* The development and refinement of forecasts of seasonal and interannual climate variability, including study and prediction of the El Niño phenomena.

• *Climate Change Over Decades to Centuries:* Analysis and projection of the effects of long-term climate change on natural resources, public health, and socio-economic sectors.

• *Changes in Ozone, UV Radiation, and Atmospheric Chemistry:* Research on the causes, rate, magnitude, and human health and ecological consequences of changes in stratospheric ozone, UV radiation, and atmospheric chemistry.

• *Changes in Land Cover and Terrestrial and Aquatic Ecosystems:* Research on the causes and consequences of land-cover changes, and on basic processes governing the functions and structure of terrestrial, aquatic, and marine ecosystems.

New Research Directions: Global change research is providing the information about the changing Earth system, and in particular, about climate change, that is needed to achieve a sustainable future. New research efforts include:

• *A National Assessment of Climate Change Impacts* to aggregate information across regions and sectors, analyze national-scale consequences, and support development of mitigation and adaptation strategies.

• *Improved Regional-scale Analyses*, including regional estimates of the rate and magnitude of climate change, analyses of the environmental and socio-economic consequences of climate change in the context of other stresses, and integrated assessments of the implications for society and the environment of climate change.

• *Regional Workshops* to examine the vulnerabilities of various regions of the United States to climate change.

FACT SHEET ON PNGV

October 22, 1997

Announced at the White House on September 29, 1993 by President Clinton, Vice President Gore, and the CEOs of the domestic auto makers, the Partnership for a New Generation of Vehicles (PNGV) is a partnership between the U.S. Federal government (7 agencies and 20 federal laboratories) and Chrysler, Ford, and General Motors that aims to strengthen America's competitiveness by developing technologies for a new generation of vehicles. Its programs include research support for over 350 automotive suppliers, universities, and small businesses.

PNGV's long-term goal is to develop production prototypes of an attractive, affordable car that can meet all applicable environmental and safety times and achieve up to three times the fuel efficiency of a comparable automobile sold today. This would mean that a typical midsize car would be able to achieve 80 mpg. The partnership also aims to (i) improve automotive manufacturing, and (ii) introduce efficiency technologies into production vehicles as soon as they are economically justified.

There are numerous reasons for pursuing PNGV, including:

- **Environmental:** Automobiles are a major contributor to atmospheric carbon dioxide, a major greenhouse gas. Already, concentrations of carbon dioxide are 25 percent higher than pre-industrial levels and are expected to double within the next century. Since the number of registered vehicles in the United States is expected to climb from 194 million in 1993, to as many as 270 million in 2010, PNGV's success is critical to any program of controlling US and world greenhouse gas emissions. It will also result in low cost methods for controlling the emissions that contribute to urban air pollution.

- **Reducing U.S. Dependence on Foreign Oil**: The United States currently imports 50 percent of the oil we consume -- this share is expected to grow to more than 60 percent by 2010. Petroleum imports make up ten percent of our country's import inventory and account for a large chunk of the nation's trade deficit. This dependence on foreign oil makes the United States vulnerable.

PNGV Status Report: The industrial partners are now in the process of selecting technologies that will be included in concept vehicles that will be completed by the turn of the century. The federal agencies are working to revise their research priorities to support both technologies that can be incorporated in production prototypes for 2004 and that can be integrated into even more advanced vehicles that would be designed in later years.

The goal of the program, while extremely ambitious, still seems possible given the advances in key technology that have been achieved during the life of the program. These include advances in production of low-cost, light-weight materials for the vehicle body and frame; electrical control systems, batteries; and compact, inexpensive fuel cells -- including the new technology for using gasoline to power fuel cells announced yesterday; and, advanced internal combustion engines for use in hybrid vehicles.

FACT SHEET ON FUEL CELLS

October 22, 1997

THE BREAKTHROUGH: A gasoline-powered technology that would allow you to double the fuel efficiency of a car and emit half the greenhouse gases and virtually no other air pollution. For the first time, gasoline was used to produce electricity from a pollution-free fuel cell, allowing the use of the existing gasoline infrastructure. Previously, fuel cells have been powered by hydrogen or methanol, which are less convenient for use in cars.

The Department of Energy, together with Los Alamos National Laboratory, and A.D. Little, have developed a breakthrough fuel processor, which can extract hydrogen from gasoline and other fuels such as ethanol and natural gas. Last week, this fuel processor was combined with a fuel cell from Plug Power to demonstrate for the first time that a fuel cell electric car could be fueled by gasoline or ethanol. This eliminates the limited driving range and lengthy recharging times associated with electric cars that run on batteries.

WHAT IS A FUEL CELL: The fuel cell converts the chemical energy of a fuel directly into usable electricity and heat without combustion. Fuel cells are similar to batteries in that both produce a direct current by means of an electrochemical process, but fuel cells can operate indefinitely as long as fuel is supplied to them. Fuel cells can provide power for cars and other applications, such as electricity and hot water for buildings.

The Department of Energy working with its partners has brought down the cost of proton exchange membrane (PEM) fuel cells by a factor of twenty in the last ten years. Continued R&D, coupled with the economies of scale from mass production of fuel cells as they enter the marketplace, should allow us to maintain this pace of cost reduction for another decade.

PARTNERSHIP FOR A NEW GENERATION OF VEHICLES (PNGV): The fuel cell breakthrough was accomplished as part of President Clinton's PNGV initiative, an innovative partnership between the government, the national laboratories, the big three automakers, and their suppliers. PNGV's goal is to develop a family-sized vehicle with triple the fuel efficiency of today's cars, without compromising cost or convenience.

POTENTIAL GREENHOUSE GAS REDUCTIONS: One-third of the nation's carbon dioxide emissions comes from the transportation sector, primarily cars. Fuel cell technology alone can directly double fuel efficiency and cut carbon dioxide emissions in half. In combination with other PNGV advances, such as lightweight materials and regenerative breaking, fuel cells will allow a tripling of fuel efficiency and a further reduction in greenhouse gas emissions. Powering the fuel cell with renewable fuels, such as ethanol, could eliminate automotive greenhouse gas emissions entirely in the long run. The buildings sector also generates one-third of the nation's emissions of carbon dioxide. A building that uses the electricity and hot water from a fuel cell fueled by natural gas would have about half of the greenhouse gas emissions of the average building today. Plug Power expects to introduce fuel cells for homes and other buildings in 2000 that will provide electricity for less than the current residential rate. By 2010, fuel cells in buildings could be providing emissions savings of five million metric tons of carbon.

FACT SHEET ON PATH

October 22, 1997

What is PATH? We are working to develop a partnership for 21st century housing bringing together government and industry to develop, demonstrate and deploy housing technologies, designs and practices that can significantly improve the quality of housing without raising the cost of construction. The **Partnership for Advancing Technologies in Housing** includes government (DOE, HUD, EPA, Labor, Commerce, FEMA, and DOD) and industry working together develop, demonstrate and deploy housing technologies and practices so that homes can be built cheaper, more environmentally sustainable, more disaster resistant, and provide a safer working environment.

PATH has a five-part approach:

- Industry-driven research on new technologies and practices
- Working with industry on pilot programs building thousands of marketable houses
- Streamlining of federal, state and local codes and regulations
- Judicious use of existing authority on standards
- Information campaign to influence consumer demand

R&D: Support more funds for accelerated research and demonstration of inexpensive, highly efficient, highly attractive housing. Link with million solar roofs program.

Standards: The success of PATH will in some part be based on utilizing existing authorities on standards for a select few products that have the potential for great savings. There are five appliance/products currently under review by DoE; Clothes Washers, Ranges/Ovens, Ballasts, Residential water heaters, transformers. Of these, the Clothes Washers and Water Heaters seem to have greatest potential.

Creating Markets: The key to making the Partnership successful will be the ability to create markets and consumer demands for homes that meet the PATH goals. The Partnership will work with states and communities to help them understand the benefits of building these homes, and the opportunities it affords the communities for economic growth. The Partnership will attempt to gain agreements between communities that PATH homes can go through an expedited permitting process.

Education and Outreach: Marketing the benefits of these homes to consumers and to encourage consumers to begin to ask for homes that are built to the quality level of >PATH= homes. This will need to be an intensive campaign of getting the message out to communities, builders and developers. This will provide incentives for more and more builders to want to build these homes.

Pilots: The pilots will play an important role in the success of PATH. The pilot sites will begin of developing the markets and demonstrate the feasibility of the homes. The pilot sites can also act as training sites for builders and community leaders to learn about the benefits of the technologies and as a classroom for training on how to use the technologies. Sites under consideration are Stapleton Airport, Denver (Redevelopment of old airport site near-downtown) and Florida (Working with the State to link energy and environment to disaster resistance and affordability).

Regulatory Streamlining: Working with states and communities on making the code approval process more efficient and less time consuming.

FACT SHEET ON POTENTIAL INDUSTRY SECTOR SAVINGS

October 22, 1997

The industrial sector produces approximately one-third of total U.S. emissions. We can cut emissions substantially in this sector through the right mix of tax incentives, accelerated research and development, electricity restructuring, and environmental regulatory reinvention. According to a recently released report from five of the nation's energy laboratories, programs such as the ones below can reduce emissions in the industrial sector in 2010 by 28 million metric tons even with no increase in energy prices.

Increasing Energy Efficiency: Energy audits encourage systematic approaches to energy efficiency that typically have high yields. Southwire Corporation, a large manufacturer of wire, rod, and cable, cut their use of natural gas by 60 percent and cut electricity use by 40 percent per pound of product produced. Motors consume 70 percent of industrial electricity used, and there is room for improving their efficiency. The Greenville Tube Company, for example, increased productivity by 15 percent, increased energy efficiency by 30 percent, reduced scrap by 15 percent, and achieved $77,000 per year savings -- a 6 month payback -- by improving the efficiency of their motors.

Cogeneration (Combined Heat and Power): New technologies available in the industrial sector will allow us to capture the waste heat the U.S. now throws away. With the right policies, industrial cogeneration of natural gas or biomass could cut annual carbon emission significantly by 2010. Advanced turbines developed by DOE with industry will be available in three years (orders are already being taken). They have an overall efficiency of 80 percent to 90 percent, produce steam together with low-cost electricity and significantly reduce NOx emissions. These turbines can run on natural gas or biomass. Some industries have their own low-cost biomass feedstocks (for example, black liquor gasification in the pulp and paper industry), which makes possible cogeneration with nearly zero carbon emissions.

Expanding Industries of the Future: The seven most energy-intensive industries—steel, aluminum, petroleum refining, chemicals, pulp and paper products, glass, and metal casting—account for about 80 percent of the carbon emissions in U.S. manufacturing and more than 90 percent of the hazardous waste. Industry, partnering with the Department of Energy, has developed long-term visions of energy-efficient, low-polluting, highly competitive "Industries of the Future" as well as technology roadmaps to identify an R&D and deployment pathway to achieving the vision. Visions typically foresee annual energy efficiency improvements of 1.0 percent to 1.5 percent for two decades.

FACT SHEET ON POTENTIAL BUILDINGS SECTOR SAVINGS

October 22, 1997

The buildings sector also produces approximately one-third of total U.S. emissions. There is substantial opportunity to improve the energy efficiency of our buildings and the appliances in them. Many of these technologies improve the quality of service delivered (i.e. higher quality lighting), and have also been documented in a number of cases to improve productivity. According to a recently released report from five of the nation's energy laboratories, programs such as the ones below can reduce emissions in the buildings sector in 2010 by 25 million metric tons even with no increase in energy prices.

Standards: Substantial carbon emissions reductions in 2010 can be achieved through existing authority of the Department of Energy to establish market-oriented efficiency standards for appliances, such as refrigerators and air conditioners. The Department of Energy uses a consensus-based approach in which manufacturers, environmentalists, consumer advocates, and the states work together to develop applicable standards.

Voluntary Programs: Significant carbon reductions in 2010 could also be achieved by expanding voluntary programs such as the joint EPA–DOE Energy Star program. Energy Star labeling has already transformed a number of markets. For example, it has cut the energy used by computers, monitors, and printers by 50 percent at virtually no incremental cost. It is now being extended to dozens of other products.

Adopting Best Electricity Engineering Practices: Electronic equipment consumes electricity in stand-by mode (even when not being used) generating 12 MMTs of carbon emission each year. Preliminary analysis suggests that 80 percent of that could be saved through adopting best engineering practices without reducing service.

Research and Development: Designing buildings with advanced technology can reduce energy consumption by 25 to 50 percent without increasing the building's initial cost. The extra cost of some of the energy-efficient equipment is offset by the smaller required heating and cooling system.

Combined Heat and Power: As in industry, we can reduce the carbon intensity of the buildings sector by accelerating the use of combined heat and power (CHP). Two CHP technologies—small turbines and proton-exchange membrane (PEM) fuel cells—can convert natural gas to useful energy with 80 to 90 percent efficiency, significantly cutting carbon emissions from a building.

FACT SHEET ON POTENTIAL TRANSPORTATION SECTOR SAVINGS

October 22, 1997

The transportation sector produces approximately one-third of total U.S. emissions. According to a recently released report from five of the nation's energy laboratories, programs such as the ones below can reduce emissions in the transportation sector in 2010 by 73 million metric tons even with no increase in energy prices.

High Efficiency Cars And Light Trucks: The goal of the President's Partnership for a New Generation of Vehicles is to produce cars that are three times more efficient than current vehicles with no compromise in size, safety, comfort or cost. The objective is a production prototype vehicle with a fuel efficiency of 80 mpg in 2004 and commercial availability soon after. A variety of efficient technologies such as hybrid vehicle design, advanced engines, regenerative braking and lightweight materials are under development. These technologies are also applicable to light trucks and sport utility vehicles, so that a PNGV for these heavier passenger vehicles is quite possible with an expanded research effort.

High efficiency heavy trucks: Ongoing federal R&D on advanced diesel engines and lightweight materials have the potential to substantially reduce carbon emissions from heavy trucks. These technologies are projected to be available by about 2003 and be quickly adopted by trucking manufacturers since energy is a major cost component of freight transportation (a truck typically gets 7 to 8 miles per gallon while traveling over 50,000 miles a year).

Advanced Efficient Aircraft and Rail: Ongoing federal R&D on advanced aircraft engines, improved airframes, and air traffic control have the potential to improve aircraft energy efficiency by 35 percent, with an additional increment of carbon emissions reductions achieved by increasing the efficiency of trains.

Low-Carbon Fuel: Government-industry R&D partnerships have brought the cost of ethanol from cellulosic waste (such as crop waste) and dedicated crops (such as switchgrass) from $3.60 per gallon in 1980 to $1.20 per gallon today. Such fuels are carbon neutral because the crops capture carbon dioxide when they grow and release it during combustion.

Talking Points on President's Climate Change Proposal
October 22, 1997

The President has proposed an ambitious climate change plan that is environmentally strong and economically sensible. Based on the President's conviction that global climate change is the premier environmental challenge of the 21st century, the President's plan will proceed pragmatically -- in three stages and with periodic economic and scientific reviews -- to cut greenhouse gas emissions by almost 30% from levels projected for 2010.

In the first stage, the President's plan will provide funding, create incentives, build partnerships and give credit for early emissions reductions. The second phase, beginning around 2004, will review, evaluate and extend the efforts of the first phase while laying the groundwork for phase three. In phase three, an international and domestic emissions trading system would begin.

The President's plan includes the following key elements:

- **A binding, realistic target to reach 1990 emissions levels by 2008-2012.** This target is part of a comprehensive framework for agreement in Kyoto that also includes flexible, market-based mechanisms and the participation of developing countries. The President is also committed to reductions below 1990 levels in the five-year period that follows.

- **A $5 billion program of tax cuts and R&D for new technologies.** To spur energy efficiency and the development of new technologies, the President proposes a major new package of tax cuts and R&D spending amounting to $5 billion over five years.

- **Active consultations over the next 9 months on an industry-by-industry basis, with early credit for companies making early reductions.** The President is committed to working with business to get their best ideas on how they can best reduce their own emissions, and to rewarding firms that act early.

- **Developing countries must participate.** Climate change is a global problem, and requires a global solution. That's why the President has committed that the United States will not adopt binding obligations without developing country participation.

- **A domestic and international emissions trading system.** Such a system can harness the power of the market to reduce emissions, as it has with great success in the case of acid rain.

- **Encouraging the use of energy-efficient products.** The President will engage in a broad-based effort to expand the use of existing energy-efficient technologies.

- **Federal procurement and energy use.** The Department of Energy will spearhead a comprehensive effort to reduce greenhouse gas emissions from Federal sources.

- **Electricity Restructuring.** To deliver a significant down payment on emission reductions, while saving consumers billions, we will pursue a bold plan for electricity restructuring.

- **Setting a concentration goal.** With advice from the National Academy of Sciences, the U.S. supports developing a specific, long-term concentration goal for greenhouse gases in the atmosphere.

- **Transition assistance.** The President is committed to working with Congress and labor to ensure a just transition for any workers dislocated by the changes in energy usage inherent in any climate change plan.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

20 October 1997

JCY
cc: JAF
AM
RL
JA

MEMORANDUM FOR GENE SPERLING
KATIE MCGINTY
JANET YELLEN
TODD STERN
DAVID SANDALOW
PETER ORSZAG
JEFF FRANKEL

FROM: ROSINA M. BIERBAUM

RE: HEADS UP ON C02 EMISSIONS STUDIES
****

Attached, please find 2 studies that will be released sometime this week.

1) The Battelle study (see p. 10) says costs of stabilizing US emissions at 1990 level by 2010 range from $26/ton carbon to $108/ton carbon -- depending on trading.

2) The WWF study puts emissions at 20% below 1990 levels by 2010 "with net economic benefits."

PNNL-xxxxxx
Working Paper

Return to 1990: The Cost of Mitigating United States Carbon Emissions in the Post-2000 Period

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RD Sands
MA Wise

October 1997

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Pacific Northwest National Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute

Battelle

DISCLAIMER

Return to 1990
The Cost of Mitigating United States Carbon Emissions in the Post-2000 Period

James A. Edmonds
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More than 160 nations have signed the Framework Convention on Climate Change (FCCC). That agreement required Annex I nations, the developed nations of the world plus economies of the Former Soviet Union and Eastern Europe,[1] to undertake measures to return emissions to 1990 levels or below in the year 2000. The parties to the FCCC met in Berlin in the Spring of 1995 and determined that additional measures were required to implement the ultimate objective of the FCCC, "*to stabilize the concentration of greenhouse gases in the atmosphere at a level which would prevent dangerous anthropogenic interference with the climate system.*"

Subsequent to the Berlin discussions, nations of the world have begun to consider measures that would set quantifiable emissions limitation requirements in the post-2000 period for Annex I nations.[2] A variety of measures have been considered. The purpose of this paper is to explore the economic consequences of efficient policy instruments—carbon taxes or tradable emissions permits—which might be employed to achieve a variety of targets in the post-2000 time frame.

We begin by describing our general approach and the variety of policy runs to be considered. We then review some of the necessary assumptions for this exercise, as well as the structure and calibration of the Second Generation Model (SGM). Finally, we discuss the results of our analysis, including time paths of emissions and measures of cost.

[1] Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Czechoslovakia, Denmark, European Economic Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Lithuania, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and the United States.

[2] In the United States, efforts were undertaken by the Interagency Analytical Team, and results were summarized in United States Government (1997). The Second Generation Modeling team was one of three modeling teams which participated in the evaluation of potential emission mitigation measures under discussion.

EMISSIONS MITIGATION SCENARIOS

Four scenarios were constructed that reduce carbon emissions in Annex I countries by 2010. The SGM was used to simulate the impact of these scenarios on the United States economy. In each scenario, emissions are reduced linearly from 2000 to the emissions target in 2010. Since the SGM operates with five-year time steps, emissions in the year 2000 are at reference case levels, and emissions targets in 2005 are half-way between year 2000 emissions and the target emissions level required in year 2010. Figure 1 shows United States emissions paths for the four scenarios as well as reference emissions.

M1990	Emissions from Annex I regions must be no greater than 1990 emissions levels beginning in the year 2010.
M1990+10%	Emissions from Annex I regions must be no greater than 10% above 1990 emissions levels, beginning in the year 2010.
M1990-10%	Emissions from Annex I regions must be no greater than 10% below 1990 emissions levels, beginning in the year 2010.
M1995	Emissions from Annex I regions must be no greater than 1995 emissions levels beginning in the year 2010.

[Figure 1. Carbon Emissions Scenarios for the United States]

These mitigation policies were run under three emissions trading regimes: independent emissions mitigation, Annex I joint mitigation, and Annex I mitigation with global permit trading. In the independent emissions mitigation case, each Annex I region must individually reach the stated emissions target without any trading of permits across regions. The Annex I joint mitigation case allows Annex I regions to trade permits amongst themselves so long as the total constraint is met in each time period. The global permit trading case allows permit trading across all regions, including those not in Annex I. The Annex I joint mitigation and global permit trading regimes result in a single Annex I or global permit price common to all regions in the market for carbon permits.

In none of the above scenarios and trading combinations are non-Annex I regions forced to constrain their emissions. No mitigation targets or emissions trajectories are imposed on those regions. Under the global permit trading regime, non-Annex I regions participate in the market for carbon permits only when it is to their economic benefit to do so. These regions are allocated permits equal to their projected baseline emissions, so they are only required to reduce their emissions by an amount equal to the number of permits they wish to sell.

Eastern Europe and Former Soviet Union Permit Allocations

Eastern Europe and the Former Soviet Union (EEFSU) present a special case because carbon emissions are currently below the benchmark year of 1990. Two approaches to permit allocations for EEFSU regions have been discussed in recent months. The first allocates permits based on the stated policy scenario (e.g., M1990 allocates permits based on 1990 emissions level) so that permits are allocated to EEFSU in the same way as they are to other Annex I regions. Because of

the decline in emissions in those regions from 1990 to 1995, however, this approach results in 'paper credits' equal to the difference between the lower post-1990 emissions and the policy-level (i.e., 1990) emissions being granted to EEFSU. For example, the FSU's baseline emissions level in 2010 is 836 TgC, significantly lower than its 1990 emissions of 1050 TgC. If granted permits equal to its 1990 emissions, the FSU would have 214 TgC worth of permits more in 2010 than its projected emissions, giving the region 214 TgC worth of permits to sell without incurring any emissions reductions of its own.

The second approach to allocating permits to EEFSU is to grant permits equal to reference emissions in each period until the projected path is constrained by the policy. For example, in the M1990-10% case, the FSU would be granted permits equal to its projected baseline emissions because emissions in the policy years never recover to 1990 levels.

For the purpose of this exercise, we chose to use the latter approach in allocating emissions to Eastern Europe and the Former Soviet Union. This baseline allocation scheme ensures that the stated Annex I emissions targets are achieved in both the independent mitigation and permit trading scenarios.

APPROACH

The SGM is a computable general equilibrium economic model that projects economic activity, energy consumption, and carbon emissions for twelve world regions, including the United States. The twelve SGM regions listed in Table 1 provide the necessary global coverage to simulate a system of global carbon permit trading. We also simulate a carbon permit trading system among the Annex I countries only, which are represented by seven of the twelve SGM regions. Our strategy has been to continually expand the number of regions by breaking them out of the Rest of World region. The Rest of World includes Latin America, Africa, and other Asian countries.

Table 1. Regions in the SGM

Annex I	Non-Annex I
United States	China
Canada	India
Western Europe	Mexico
Japan	South Korea
Australia	Rest of World
Former Soviet Union	
Eastern Europe	

While carbon emissions in most regions are anticipated to increase over time, this is not true for the Eastern Europe and Former Soviet Union Regions. Emissions in these regions have declined since 1990.

Each of the four emissions mitigation scenarios defines a set of emissions rights for the Annex I regions. Carbon taxes are used to constrain emissions for the cases of independent emissions mitigation, Annex I joint mitigation, and Annex I mitigation with global trading of emissions rights.

In the independent case, each Annex I region meets its own emissions targets independently. A time series of carbon taxes is determined for each region to reduce emissions to be equal to its emissions rights.

With Annex I joint mitigation, a common carbon tax is applied to all Annex I regions to meet the overall Annex I emissions target. However, regions that emit more carbon than their emissions rights must pay the other Annex I regions an amount equal to the difference in emissions valued at the common carbon tax.

In the global trading case, emissions are reduced from the global reference case by the same amount as the difference between Annex I reference emissions and Annex I emissions rights. The SGM is used to determine a global carbon tax just large enough to meet the global emissions target. This global carbon tax turns out to be lower than the carbon taxes required for independent mitigation by Annex I countries. Therefore, Annex I countries emit more carbon than in the independent case, but still less than in the reference case. Annex I countries must purchase rights to emit carbon from the non-Annex I countries. The non-Annex I regions must reduce their own emissions levels to sell those permits to the Annex I regions.

In this paper, we summarize the following results for the United States for each scenario: time series of carbon emissions; carbon taxes required for emissions mitigation; and measures of the cost of mitigation.

MODEL OVERVIEW

The SGM is designed specifically to address issues associated with global change. The model is designed to perform the following types of analysis:

1. Provide estimates of future time paths of environmentally important emissions associated with economic activity.

2. Provide estimates of the economic cost of actions to reduce greenhouse gas emissions.

Sectors

The SGM has nine producing sectors and twelve inputs to production. The inputs are labor, land, capital, and the nine produced goods. Economic detail is maintained in the energy supply and transformation sectors, but collapsed elsewhere into one large "everything else" sector. Price stability is maintained by keeping the price for goods produced by the "everything else" sector equal to 1.0 during all time periods.

Five different fuels are used for producing electricity, resulting in five subsectors for the electric generating sector. A separate economic production function, of the constant elasticity of substitution (CES) functional form, is used for each sector or subsector. Capital investment decisions depend on an assumed lifetime of capital for each sector or subsector. Capital lifetimes range from 15 years in the oil, gas, and coal production sectors to 70 years for hydroelectric power. The relative size of each production sector and subsector is shown in Table 2.

Table 2. Producing Sectors in the SGM

	Producing Sector	Gross Output in 1985 (millions of 1985 $)	
1	Agriculture	468,618	
2	Everything Else	5,086,486	
3	Oil Production	64,171	
4	Gas Production	45,804	
5	Coal Production	20,006	
6	Uranium Processing	2,195	
7	Electricity Generation	165,800	
	a. oil		10,959
	b. gas		34,152
	c. coal		85,930
	d. nuclear		21,370
	e. hydro		13,389
8	Petroleum Refining	145,015	
9	Gas Transmission and Distribution	105,330	

Market Clearing

In the SGM, markets are said to *clear*. In other words, the SGM solves for the set of prices for all markets (or sectors) in the modeled economy so that demands and supplies of each market are in equilibrium. The set of prices in which the equilibrium holds is called the *market-clearing* price set. In an equilibrium model like the SGM, markets are linked to other markets through the market-clearing process. For example, a change in the demand for coal will have an effect on not just the price of coal, but also the prices of oil, gas, and, at least indirectly, the prices of all markets in the economy.

Carbon permit prices and taxes are also solved by the SGM as part of the market equilibrium. Specifically, the SGM finds the carbon price such that, given that market-clearing equilibrium prices hold in the rest of the markets, the amount of carbon emitted is just equal to the carbon constraint of the region or group of regions under a carbon emissions limitation constraint.

Carbon Taxes and Revenue Recycling

The SGM uses a carbon tax within each region to provide an economic incentive for the economy to substitute away from carbon. Revenues obtained from the carbon tax can be very large and it makes a difference, in terms of final economic cost, how the revenues are recycled. For this exercise, we assume that all carbon tax revenues are recycled back to consumers through a lump-sum government transfer.

For the cases where emissions rights are traded between countries, each SGM region is allocated an initial amount of carbon emissions permits. Carbon permits can then be traded between countries at a price that clears the global market in these permits.

Modes of Operation

All of the SGM regions were initially developed as single-region models with a base year of 1985. Each regional model operates in five-year time steps through either 2030, 2050, or 2100. Often, the models were developed in collaboration with experts from that country. It is possible to run all of the regions simultaneously in a global model with international trade. The three modes of operation for the SGM are:

1. Single Region
2. Global with Partial Market Clearing
3. Global with Full Market Clearing

Single-region operation. For each SGM region, all produced goods are classified as being tradable, nontradable, or traded at a fixed quantity. When SGM regions are operated independently, a fixed world price is assumed for each tradable good; regions may import or export as much of that good as desired at that fixed world price, subject to an overall balance of payments constraint. For all nontradable goods, the quantity of trade is fixed in advance. The following assignments are used when the United States model is operated independently:

Numeraire Sector:	everything else (price always equals 1)
Fixed World Price:	crude oil
Fixed Trade Quantities:	agriculture, coal, nuclear fuel, refined petroleum, electricity
Nontradables:	distributed gas, land, labor

Since only relative prices matter, we are allowed to fix the price of either one produced good or one primary factor of production. For each region, the large 'everything else' sector is the numeraire, with its price fixed at 1 for all time periods. This 'everything else' good is a tradable good for all regions. An exogenous balance of payments constraint is specified in advance for each region. Most regions are assumed to move linearly from a historical trade balance in 1985 to balanced trade by 2005.

Given a trial set of prices, the SGM computes supply and demand for all producing sectors and primary factors of production. Markets for the nontradables and goods traded at fixed quantities are brought into equilibrium by searching for a set of prices that equate supply and demand. Prices are adjusted until supply and demand are within 0.01% of each other.

Global model with partial market clearing. The global version of the SGM is used when there is at least one market that must clear globally. For the scenarios described in this paper, that market is tradable carbon emission permits. The model searches for a global carbon tax, which can be interpreted as a world carbon permit price, that clears the market for permits.

Each region is initially allocated a number of carbon permits and may trade those permits at the world permit price. Some regions will be sellers of permits and some will be buyers. After trading permits, all regions must hold permits equal to the domestic level of carbon emissions.

All regions are still subject to a period by period balance of payments constraint. The model does not allow borrowing to pay for carbon emissions permits. Imports of permits must be paid for with exports of some other good.

Global model with full market clearing. There are no longer any markets with a fixed world price. A set of world prices is found that clears all world markets. Also, world markets can be created for goods that were traded in fixed quantities in the single-region model.

All of the scenarios described in this paper were run in the second mode, global with partial market clearing. This mode was chosen for two reasons. The first is that we were asked to assume a fixed time path of world oil prices for SGM model runs that were completed for the United States Government during the spring of 1997. This meant that the world oil market would not be allowed to clear in the model. The second reason is that model results are often easier to interpret when some variables in the model remain fixed over time. Although we are missing any feedback from reduced world oil consumption to lower world oil prices, the magnitude of this feedback is highly uncertain and difficult to model.

Data Requirements

Three types of data are used to construct and calibrate each region of the SGM.

1. Economic and Demographic Data
2. Energy Balances
3. Technology Descriptions

Economic data include input-output tables and supplemental information from the national income accounts. Population projections were obtained from the World Bank. Energy balance tables were obtained either from the International Energy Agency or from government agencies within a region.

Input-output tables describe, in value terms, the flow of goods between industries and consumers in an economy. However, a model concerned with quantities of carbon emissions must also be concerned with quantities of energy. An input-output table, by itself, is not sufficient to determine the quantities of oil, gas, coal, electricity, and refined petroleum that are produced and consumed. Supplemental information on energy quantities is required to map currency units from an input-output table to energy units needed to calculate levels of carbon emissions. We combine economic input-output tables with energy balance tables to create a hybrid input-output table with units of joules for energy products and real dollars for all other products. Miller and Blair (1985) provide a general description of, and the motivation for using, hybrid input-output tables.

Individual energy technologies are characterized by the annualized cost of providing an energy service. Data needed to determine the annualized cost include capital cost, equipment lifetime, annual fuel requirements, the interest rate, and other annual maintenance and operating costs.

REFERENCE CASE AND CALIBRATION

The cost of reducing greenhouse gas emissions is very dependent on the reference case. The greater the level of reference case emissions, the higher the cost of returning to 1990 emissions. Therefore, much effort is expended on creating an acceptable reference case before running any of the mitigation scenarios.

The SGM operates in five-year time steps from 1985 through 2050; results for this study are reported for 1990 through 2020. The United States reference case was closely calibrated to the Annual Energy Outlook 1997 (AEO97). Since AEO97 projects only up to the year 2015, projections beyond 2015 are SGM model results and are not calibrated to any other established projections. Projections of carbon emissions, population, GDP, primary energy consumption, and electricity generation for the United States are described below.

For the other global regions, economic and primary energy consumption growth rates were roughly calibrated to regional projections from the World Energy Outlook 1996 (WEO96). For the Former Soviet Union region, projected primary energy consumption levels were adjusted down from the WEO96 projection. Population projections for these regions were based on the World Population Projections 1994-1995, published by the World Bank. In addition to the exogenously set population levels, the international crude oil price trajectory from the AEO97 was used as an exogenously set price. Prices for all other fuels and goods in the model were determined endogenously.

The general calibration procedure is to first match GDP growth by adjusting parameters that control total factor productivity in the 'everything else' sector. Then energy consumption by primary fuel is calibrated by adjusting input-specific technical change parameters. Carbon emissions are derived directly from primary energy consumption by applying fuel-specific emission factors.

Carbon Emissions

In 1990, total carbon dioxide emissions from the combustion of fossil fuels in the United States were 1,350 million metric tons of carbon. Model results show that total carbon dioxide emissions continue to rise as fossil fuel consumption increases and emissions reach 1,871 million metric ton by 2020. This amounts to a 39 percent increase in total emission and an emissions growth rate of 1 percent per year. Reference case carbon emissions were shown earlier in Figure 1.

Gross Domestic Product

The two most important determinants of GDP are population growth and rates of change in productivity. Total population levels for the United States were taken directly from AEO97. United States population grows from 250 million in 1990 to 323 million in 2020. This represents an annual population growth rate of 0.85 percent per year.

GDP for the United States was matched to AEO97 projections by changing the total factor productivity parameter for the 'everything else' sector. Beginning with the 1990 GDP of 6.1 trillion dollars, the economy grows at 2 percent annually to reach 10.6 trillion dollars by 2020.

Primary Energy Consumption

Total primary energy consumption from 1990 to 2015 was calibrated to be within 2 percent of projections from AEO97. Primary energy consumption by fuel is shown for the United States in Figure 2. Energy consumption rises from 86 EJ in 1990 to 116 EJ in 2015. This increase represents an annual growth rate of 1 percent. The energy consumption growth rate decreases with time and in 2020, the total consumption is 119 EJ and the annual growth rate is 0.5 percent.

Crude oil is the major source of primary energy in the early years; however, natural gas competes with crude oil as the leading source of fossil fuel by 2020. Coal is the third largest source of primary energy and its consumption grows steadily at slightly less than 1 percent per year. Nuclear energy's contribution to primary energy consumption declines, while energy from renewable sources increases with time.

[Figure 2. Primary Energy Consumption – United States Reference Case]

Primary energy consumption does not grow as fast as GDP, which implies that the energy-GDP is ration is falling over time. Figure 3 shows the energy-GDP ratio generated by the SGM for the United States.

[Figure 3. Energy-GDP Ratio – United States Reference Case]]

Electricity Generation

Projections of electricity generation are similar to that of the AEO97. SGM total electricity generation results are higher than the AEO97 projections by approximately 10 percent. Electricity generation from natural gas is the reason for the higher result. Total electricity generated in 1990 is nearly 11 EJ, which grows at 1.5 percent per year and expands to 17 EJ by 2020. The major source of electricity is from the combustion of coal; however, electricity generation from natural gas plays a significantly larger role with time. In 1990, electricity generation from coal contributed to 53 percent share of the total generation, while that from natural gas combustion contributed to 17 percent of the total. By 2020, the shares of electricity generation from coal and natural gas are closer. Electricity generation from coal and natural gas comprise 44 and 34 percent share of the total respectively. Highly efficient and low cost natural gas combined cycle power plants incorporated into the SGM contribute to the growth of natural gas as the fuel for electricity generation. Nuclear power's contribution to the overall demand for electricity decline with time as existing power plants are retired and no new additional plants are constructed. Renewable energy sources for electricity generation include hydroelectricity, solar photovoltaics and others. Generation of electricity from renewable sources increases slightly from 1990 to 2020; however, renewable energy's share of total electricity remains below 10 percent of the total.

COST OF EMISSIONS MITIGATION

Although this exercise did employ the 12-region version of the SGM, discussion of results in this paper will focus on the United States. The SGM provides output on regional GDP and its components and a detailed description of the composition of energy supply. In this analysis, we will focus on the broad economic impacts on the economy. Specifically, we will discuss the permit prices required to meet the various mitigation requirements and the costs to the United States economy of undertaking such policies. We will also discuss the impacts of the domestic carbon taxes on primary energy consumption.

Permit Prices

Table 3 shows the permit prices by trading regime required for the United States to meet its emissions targets under the four mitigation scenarios. Permit prices in the United States must reach $108 per metric ton of carbon to reduce United States emissions to 1990 levels in 2010. This price increases significantly with the tighter constraint imposed under the M1990-10% case. Permit prices in the M1995 and M1990+10% scenarios are very similar as only 5 TgC separate the constraints in the two cases.

Table 3. United States Carbon Taxes Required to Meet Policy Goal Eastern Europe & FSU Allocated Reference Case Permits (1992 US$ per Metric Ton of Carbon)

	Independent Mitigation		Annex I Joint Mitigation		Annex I Mitigation with Global Trade	
	2010	2020	2010	2020	2010	2020
M1990	108	170	72	87	26	27
M1990+10%	60	110	42	58	16	18
M1990–10%	173	260	109	122	38	36
M1995	61	112	70	106	26	32

Permit prices fall as more regions are included in the market for carbon permits. In the independent emissions mitigation case, carbon emitters in the United States may undertake emissions mitigation options available only within the United States. In the Annex I joint and global permit cases, however, regions are included that have mitigation options with significantly lower costs, thereby lowering the marginal cost to the carbon permit market of meeting the desired emissions targets. As we will discuss, this 'where' flexibility in meeting emissions targets has a significant impact on costs as well as permit prices.

Permit prices tend to increase over time as it becomes more expensive to reduce emissions to the desired goal. Increasing population in the United States, and the economic growth that accompanies it, put upward pressure on emissions that, in turn, forces larger shifts away from inexpensive coal toward more expensive natural gas and renewable energy sources. The availability of relatively inexpensive abatement options in the developing world allows the permit price to remain relatively constant over time in those cases.

As the permit prices decrease across trading regimes, the United States purchases more and more permits from abroad, thereby enabling it to emit more than its allocated permits alone would allow. Figure 4 shows United States emissions for the M1990 case across the three trading regimes. Under the independent emissions mitigation regime, the United States is limited to emitting only what it is allocated under the scenario, its 1990 emissions level. With Annex I trading, however, the United States purchases 209 TgC worth of permits in 2010 and 244 TgC in 2020. The purchases increase to 316 TgC and 436 TgC in 2010 and 2020, respectively, under the global trading regime. This 'where' flexibility reduces the amount by which a permit-buying region must reduce its emissions and, therefore, reduces the cost to the region.

[Figure 4. United States Carbon Emissions – M1990 Cases]

Primary Energy Consumption

Emissions mitigation is achieved through reduction in total primary energy consumption and fuel substitution in the electricity sector. The domestic carbon tax of $108 in 2010 in the M1990 case results in a reduction of total primary energy consumption by 16 percent relative to the reference case. Primary energy consumption of coal drops by 57 percent while consumption of crude oil drops by 12 percent. Consumption of natural gas increases by 1 percent due to fuel switching. For reductions in primary energy consumption by fuel, refer to Figure 5.

[Figure 5. United States Primary Energy Consumption in 2010]

Fuel substitution in the electricity sector results in the share of electricity generated from coal dropping from 45 in the reference case to 20 percent in the M1990 case. The reduction in electricity generation from coal is compensated for by increased generation from natural gas. The share of electricity generation from natural gas increases from 29 percent in the reference case to 51 percent M1990 case.

Cost Calculations

A very convenient way to characterize the response of any SGM region to a carbon tax is by constructing a marginal cost of carbon curve. Figure 6 is a scatter plot of various carbon taxes applied to the United States economy, and the corresponding reduction in carbon emissions. Data points plotted in Figure 6 are from the four independent mitigation scenarios for the United States. Note that a positive tax is required to achieve any reductions in carbon emissions.

[Figure 6. Marginal Cost of Carbon]

The marginal cost curve is used to calculate one measure of cost that we will call the *direct cost*. For any level of carbon emissions mitigation, the direct cost is defined as the area under the marginal cost curve up to that amount of mitigation. The first units of emissions reductions are very inexpensive, successive units become more and more expensive. Figure 7 shows the shows the size of these direct costs for the United States for the four independent mitigation scenarios. Direct costs are shown at five-year intervals through 2020 as a percentage of GDP. These costs are plotted as negative numbers in Figure 7. As expected, the M1990-10% scenario shows the greatest costs.

[Figure 7. Cost of Emissions Mitigation – No Trading]

Figure 8 focuses on the M1990 case and shows how costs to the United Sates are reduced with trade in emissions permits between countries. The 'independent' cost line shown in Figure 8 is the same as the M1990 cost line in Figure 7. In 2010, costs are reduced somewhat with Annex I

trading and reduced by about one-half with global trading. In later years, the flexibility in where emissions reductions are undertaken impacts mitigation costs even more significantly.

[Figure 8. Illustration of 'Where' Flexibility – Costs for M1990 Cases]

Cost calculations for the emissions trading cases are different than in the independent case. Costs for the trading case take into account the value of permits traded. For a seller of permits, such as the United States, net cost includes the direct cost plus expenditures on carbon permits. A breakdown of these two cost components is shown for the M1990 Annex I trading case in Figure 9. Direct cost is roughly half of the net cost. The remaining cost, the difference between the 'direct cost' and 'net cost' lines in Figure 9, is the value of emissions permits that would be purchased from other Annex I countries.

[Figure 9. Cost Breakdown – M1990 Annex I Trading Case]

DISCUSSION

Several important issues have arisen during the development and operation of the SGM. In this section, we summarize some of the insights gained from our modeling activities. First, economic costs depend a great deal on our assumptions about future carbon emissions. Second, several measures of cost are available from the SGM. Third, the distribution of costs among countries in a system of global permit trading is sensitive to assumptions on exchange rates as well as the initial allocation of permits. Fourth, any system of global trade in carbon permits implies potentially large transfers of wealth from developed to developing nations. Finally, we discuss how some of our assumptions affect the results on costs.

Role of Reference Emissions in Shaping Marginal Mitigation Costs

All of the results in this study depend on assumptions used to create a reference emissions scenario from the present to 2020. The amount of mitigation required to return to 1990 levels depends directly on reference case emissions for each region. In the Annex I trading cases, carbon permit prices are particularly sensitive to reference scenarios for potential sellers of permits, especially Eastern Europe and the Former Soviet Union.

Among the Annex I countries, projecting future carbon emissions is especially uncertain for Eastern Europe and the Former Soviet Union. Of particular importance is when emissions in these regions will once again reach 1990 levels. If this point is reached before 2010, then we model EE and FSU just as any other Annex I country. If this point is reached after 2010, then emissions restrictions are not binding in EE and FSU until that point in time.

Measuring and Reporting Costs

At least two measures of cost are available from the SGM and from other models as well. The first measure, which we call the *direct cost*, can be thought of as either a deadweight loss or the integral under the marginal cost curve for carbon. Using either approach, direct cost is

approximately equal to one-half of the carbon tax (or permit price) times the reduction in carbon emissions. For the permit trading cases, direct costs are then adjusted by the value of transfer payments required to purchase or sell permits. This measure of net cost is simple to construct and is comparable across models.

Of ultimate interest, however, is the net impact on some broader measure of economic activity (such as GDP) or on economic welfare (such as real consumption). There are many reasons why the change in GDP (or real consumption) is different than direct cost net of transfer payments. These other components of cost include the effects of pre-existing distortionary taxes, changes in terms of trade, and how tax revenues are recycled. In addition, measurement of GDP (or real consumption) depends on the choice of index and base year used to construct that index. This reflects real world problems in constructing a quantity index for GDP when relative prices are changing.

Foreign Exchange Rates

Permit prices for the global permit trading cases are very sensitive to assumptions on exchange rates. This is particularly true for developing countries where market exchange rates, in local currency per U.S. dollar, are three to five times the corresponding exchange rate based on purchasing power parity. A global permit price of $100 per metric ton translates, at market exchange rates, into a much higher relative price in the developing countries than in the United States.

Exchange rates based on purchasing power parity are usually used to compare income levels between countries, but market exchange rates must be used for goods actually traded between countries. This creates a potential problem for developing countries considering participation in a global permit trading program; carbon permits would be traded at market exchange rates, while GDP losses are better measured using purchasing power parity. For developing countries, losses in GDP could be greater than the value of carbon permits sold.

International Transfer Payments

Transfer payments required by some of the permit trading scenarios can become quite large. From the point of view of a buyer of permits, the amount spent on permits should be more than offset by the avoided cost of further emissions reductions.

Transfer payments of this size will affect the pattern of other goods traded internationally. Our model does not allow regions to borrow between time periods; trade must balance during each time period. Buyers of permits must export more of other goods to pay for the permits and adhere to a balance of payments constraint.

Sensitivity of Costs to Model Assumptions

Economic costs reported by the SGM for the United States are sensitive to many of the model inputs. These include the choice of exchange rate, the inclusion of paper permits, and the method of revenue recycling.

If purchasing power parity exchange rates were used instead of market exchange rates for the developing countries, then any given world permit price would translate into a lower carbon tax in that country's local currency. For global trading cases, this would increase the global permit price needed to meet a global emissions limit, and the SGM would report higher costs for the United States.

For regions with emissions below 1990 levels, carbon permits were allocated based on their reference case, and not on 1990 emissions. If we had allocated permits based on 1990 levels, these extra 'paper permits' would create a less-stringent Annex I target. The model would then report a lower permit price for the trading cases, and a lower cost to the United States.

In this study, we assumed that all revenues from a carbon tax would be recycled as a lump sum to consumers. Another option is to use the carbon tax revenues to offset other taxes. This has the potential to reduce overall costs, since carbon tax revenues would displace other distortionary taxes.

KEY OBSERVATIONS

Economic costs are reduced with a permit-trading program that equalizes the marginal cost of carbon between countries. The least expensive emissions reductions are taken first, regardless of where they occur. Costs shown in Figure 8 provide a good example of the importance of this 'where' flexibility.

For the four mitigation scenarios in this study, economic costs to the United States remain below 1% of GDP through at least the year 2020. This was the case even in the scenarios where the United States met its mitigation targets without international trading of carbon permits.

Each region in the SGM can be characterized by a marginal cost of carbon curve, as was shown in Figure 6. This shows the approximate carbon tax required for any given level of carbon emissions reduction. For the amount of emissions reductions needed in 2010 to return to 1990 levels, a carbon tax of $108 per metric ton of carbon is required.

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Figure 1. Carbon Dioxide Emissions Scenarios for the United States

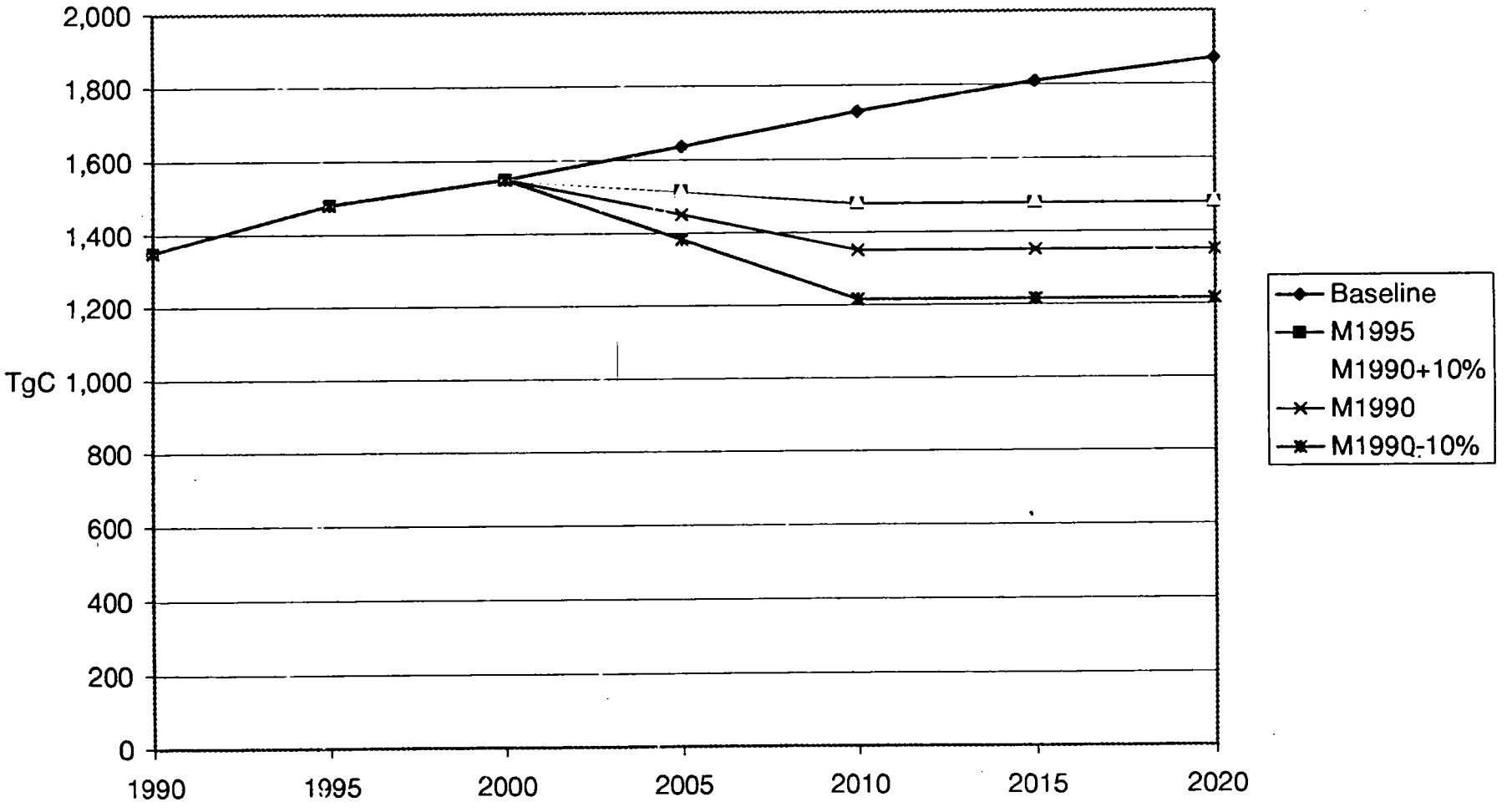


Figure 2. Primary Energy Consumption
United States Reference Case

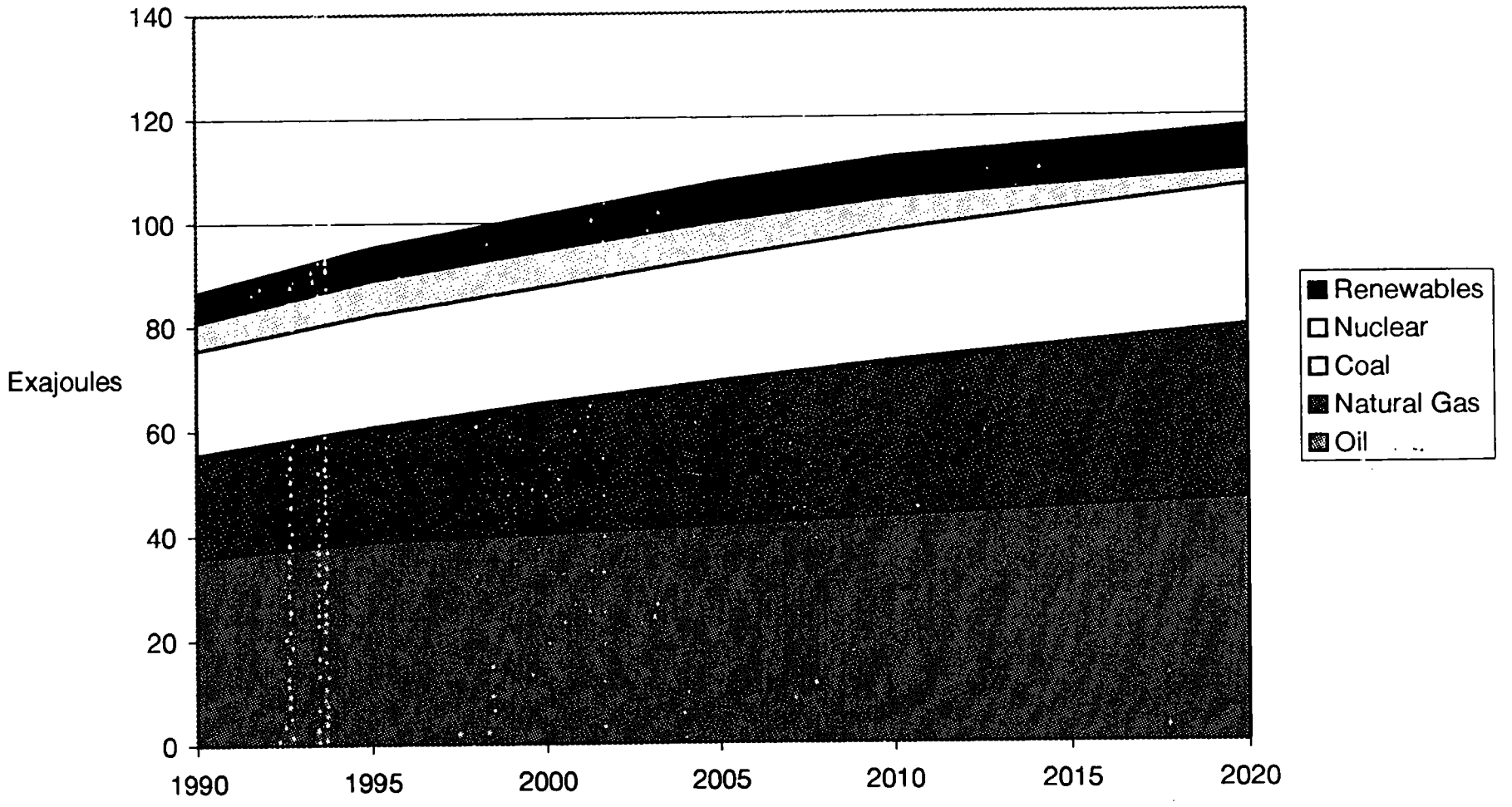


Figure 3. Energy-GDP Ratio
United States Reference Case

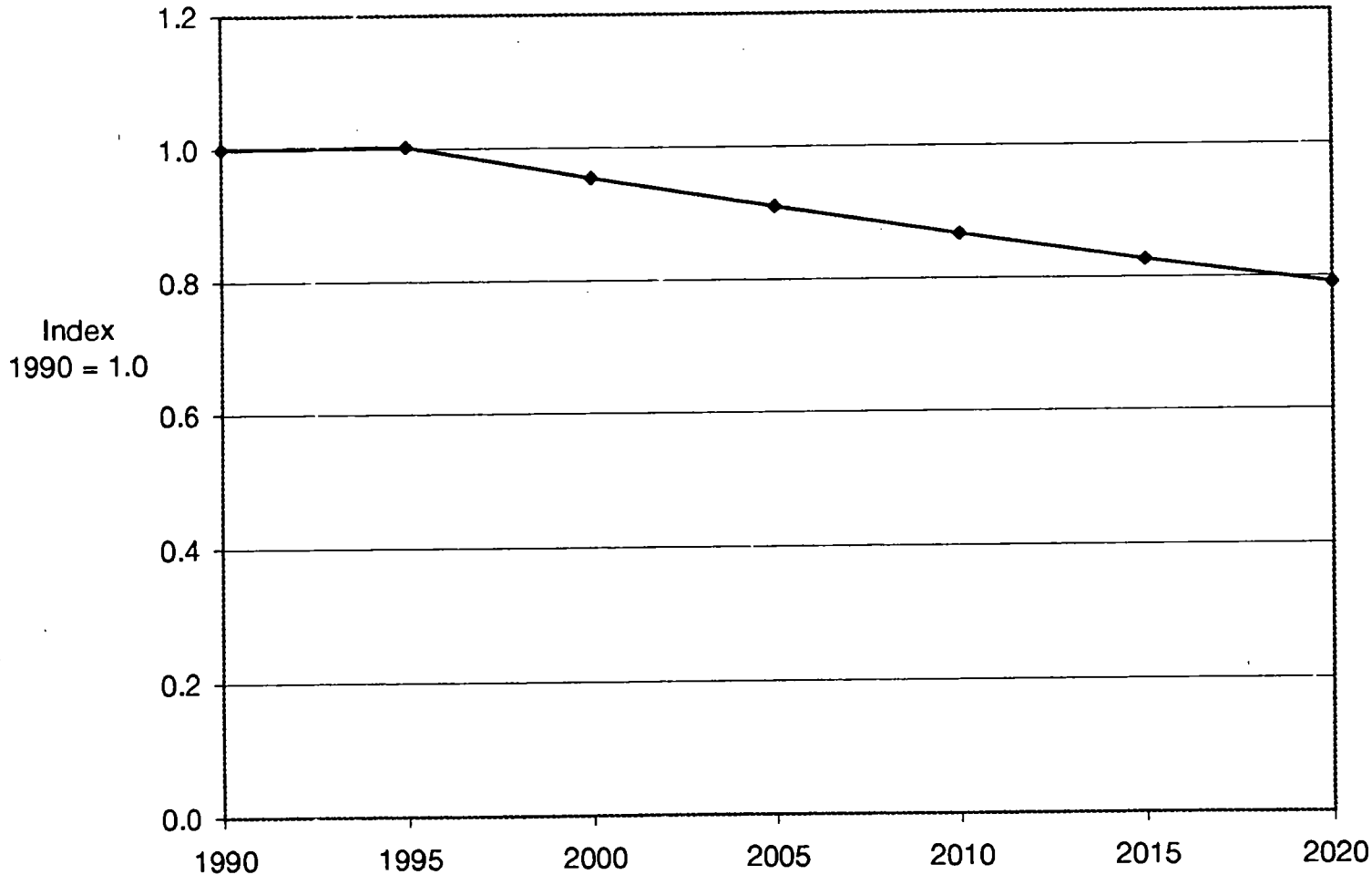


Figure 4. United States Carbon Emissions
M1990 Cases

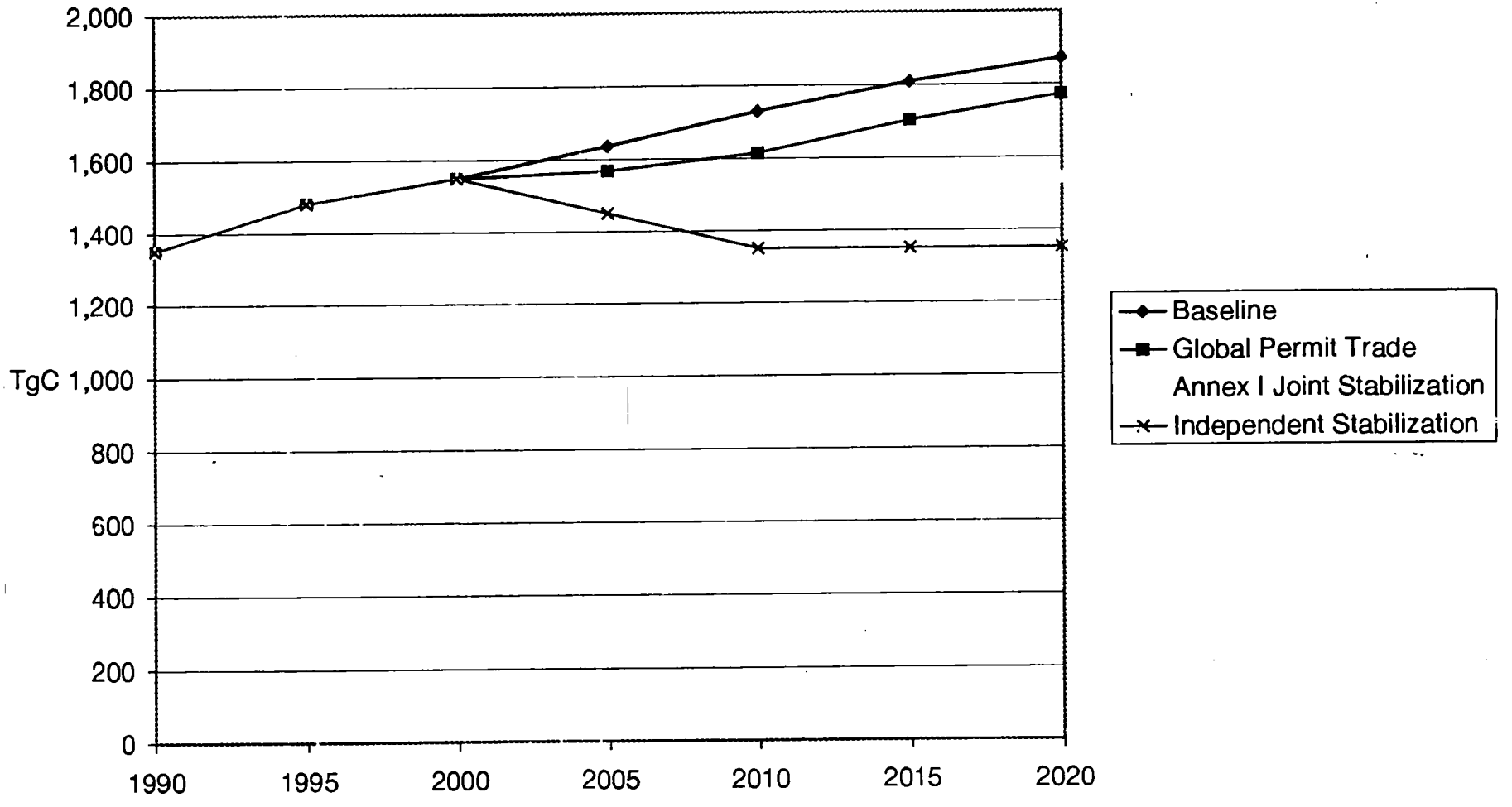


Figure 5. US Primary Energy Consumption in 2010

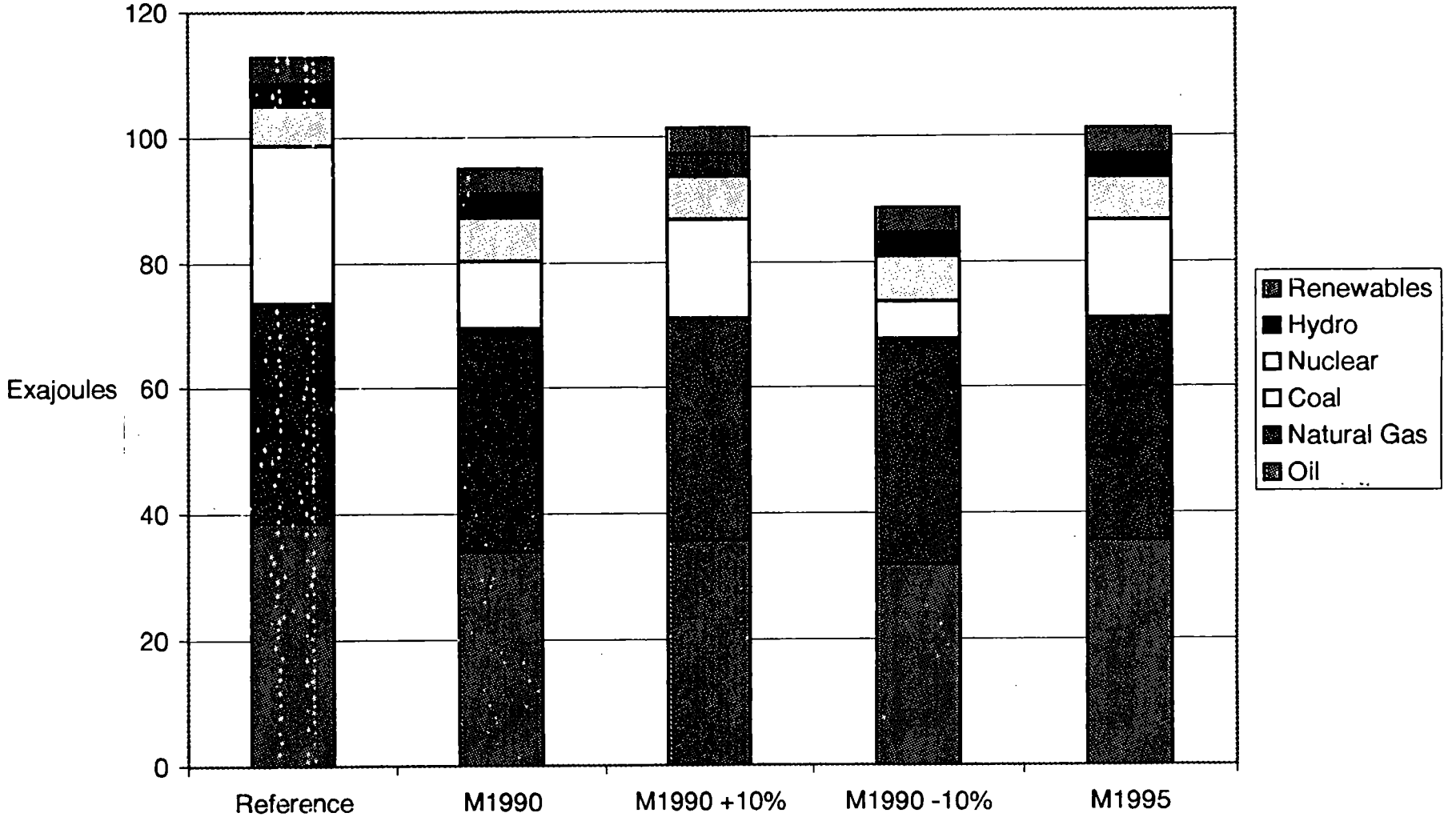


Figure 6. Marginal Cost of Carbon

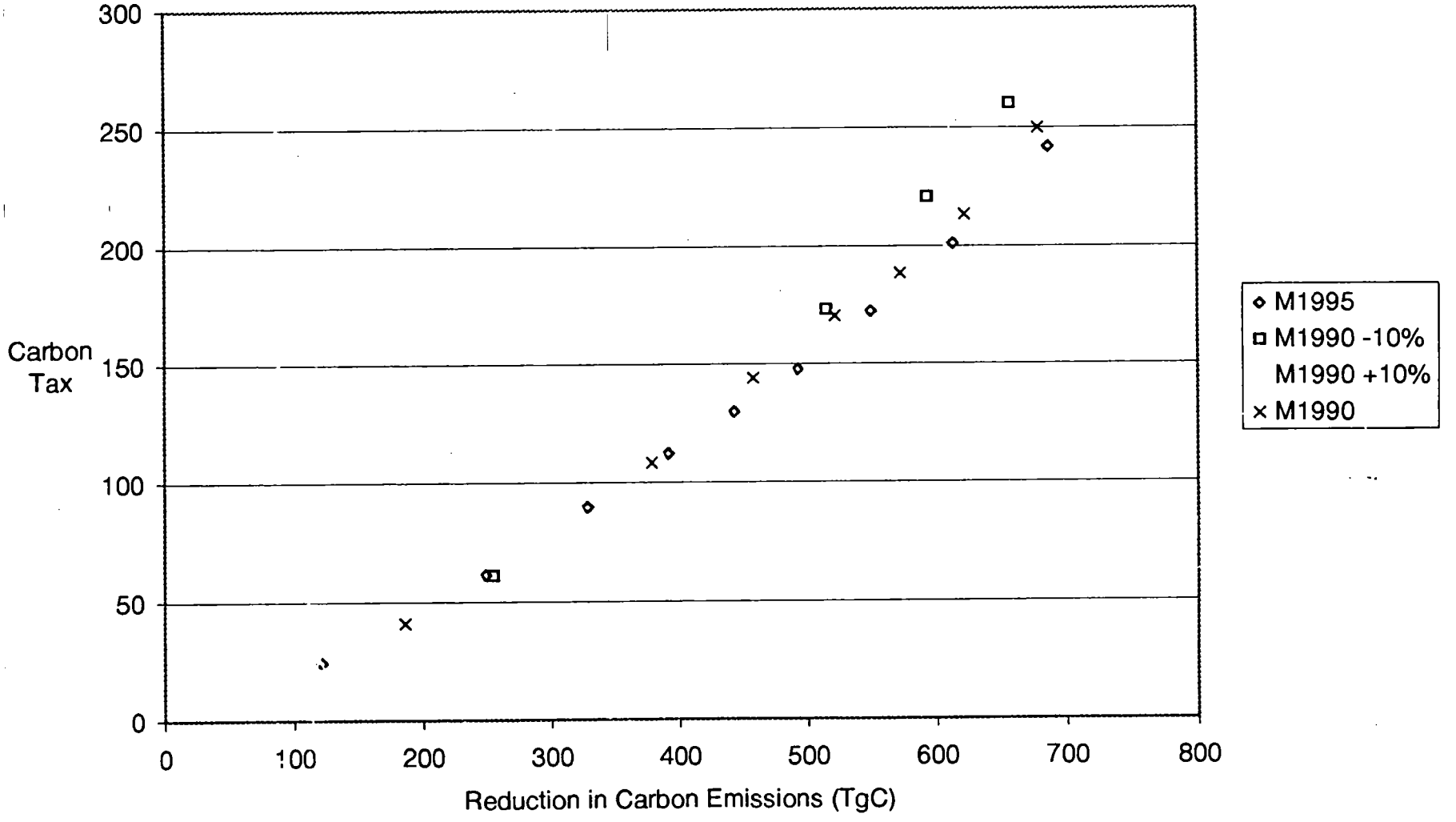


Figure 7. Cost of Emissions Mitigation
No Trading

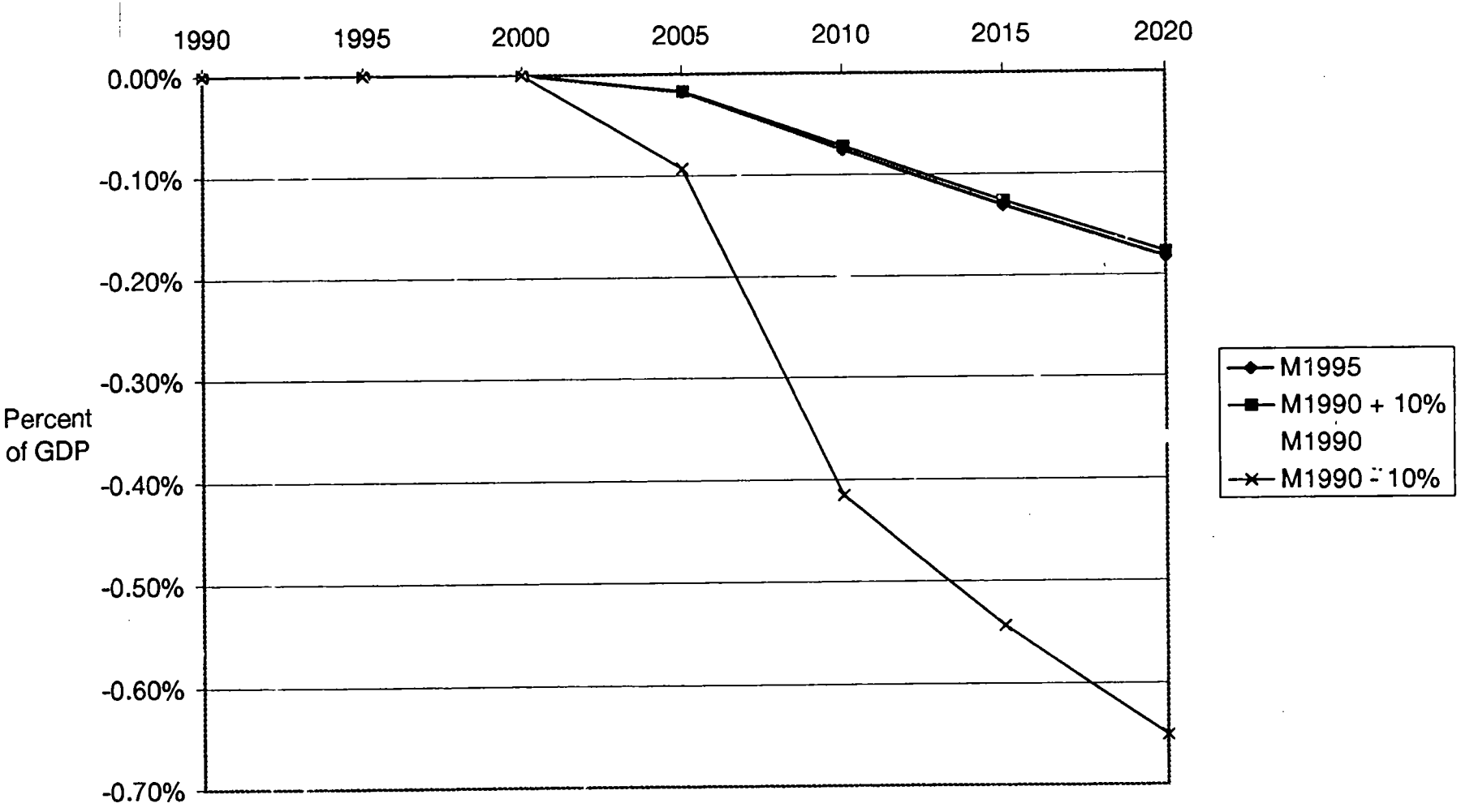


Figure 8. Illustration of 'Where' Flexibility Costs for M1990 Cases

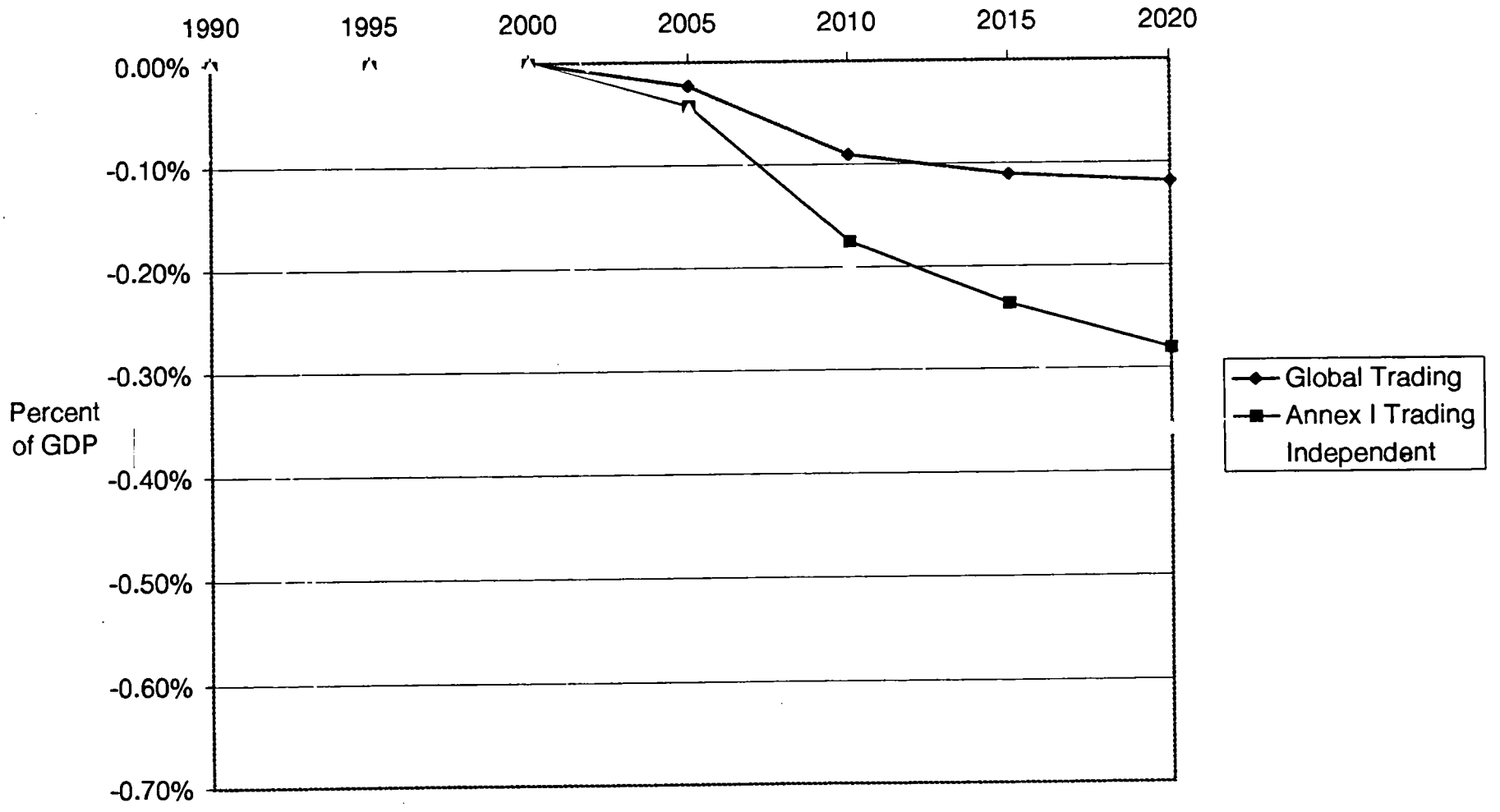
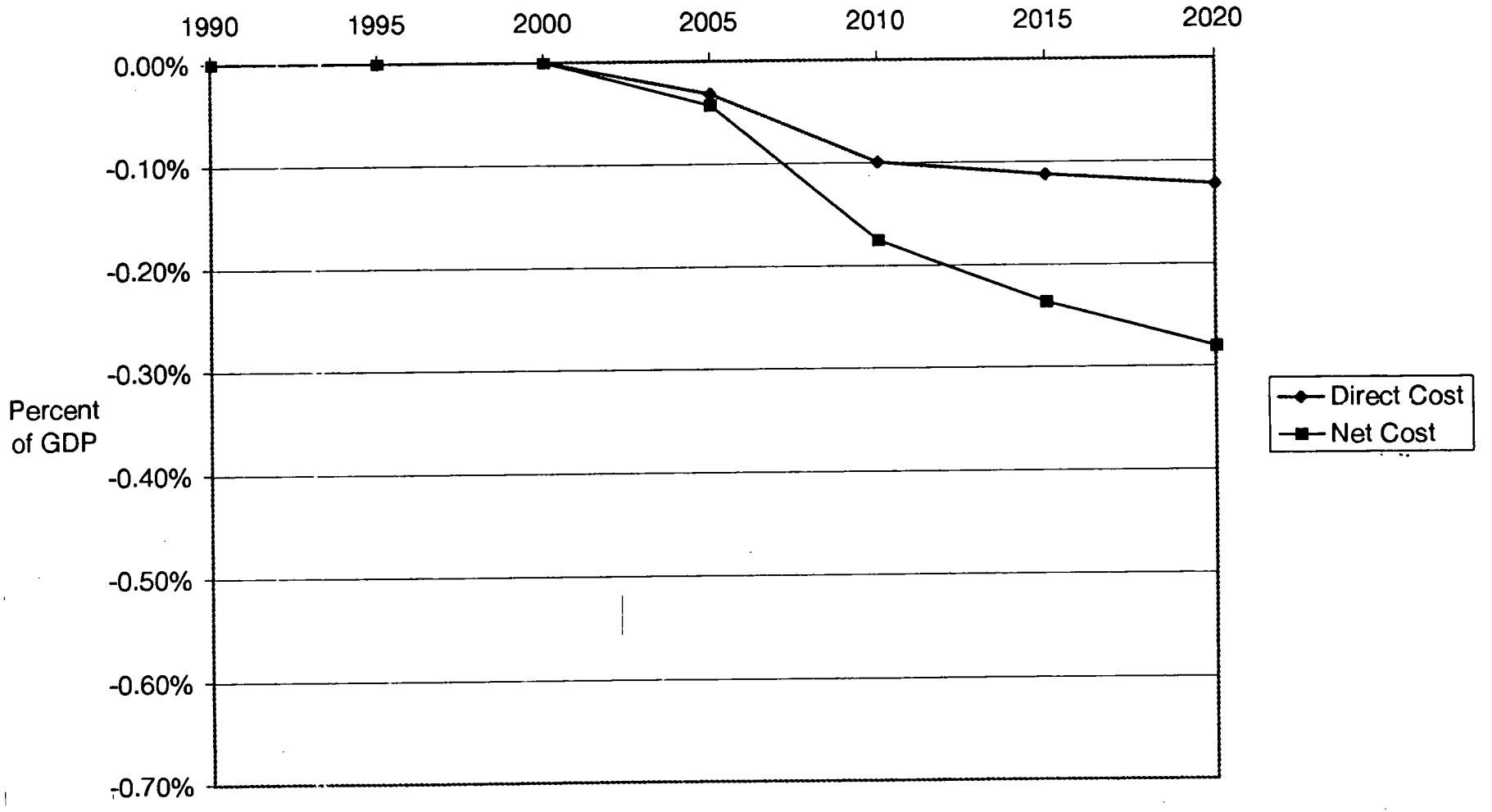


Figure 9. Cost Breakdown
M1990 Annex I Trading Case



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MEMORANDUM

To: Rosina Bierbaum

From: Adam Markham

Date: 17 October 1997

Subject: Policies and Measures to Reduce CO_2 Emissions in the United States

Rosina,

I'm attaching summaries of two new studies WWF has undertaken, and which will, I hope, be useful for you in developing a final position for Kyoto. Some additional polling carried out after we briefed you a couple of weeks ago, and a detailed new study on emissions reduction policy options, costs and benefits for the U.S.

New energy study shows potential for significant cuts below 1990 levels by 2010

The "policies and measures" study is a peer-reviewed report prepared by Boston-based consultants, the Tellus Institute. The bottom line is that it provides a blueprint for an innovative and cost-effective set of measures which, if followed, could bring US carbon emissions 21% below 1990 levels by the year 2010. Cumulative net economic benefits are calculated at more than $278 billion through 2010.

The Climate Protection scenario lays out a series of cost-effective measures including:

- Renewables content standards
- Pollutant emissions cap and trade schemes
- An advanced vehicle initiative
- Investment tax credits
- Regulatory reform
- Market transformation incentives
- Appliance and building standards
- Biomass cofiring expansion

Detailed parameters for these policies and measures were used as inputs to the Energy Information Administration's National Energy Modeling System (NEMS), and additional analysis carried out to compensate for some of the limitations of NEMS:

It is worth noting that to get the 10% reduction by 2005 requires the incremental costs to be $60/ton of CO_2. If, for example, an 8% reduction is the goal, the marginal costs would be significantly lower. It should also be noted that it would be possible to achieve the same cumulative emission reductions by 2010 without going so deep in 2005, perhaps at lower overall costs and lower marginal costs.

This report is in its final pre-publication stage, and we expect to release it early next week. I wanted you to see at least the summary as soon as possible, and I will courier a full copy of the study over as soon as we have a final draft.

New polling results show strong support for unilateral action by US at Kyoto

The other attached memo, from the Mellman Group, is self-explanatory. It details polling carried out in the first week of October, in which we tried to clarify whether Americans feel that developing countries should be required to commit to emission targets before the US takes action. The answer is clearly no. 71% support action by the developed world alone, and 57% would support unilateral US action. It seems there is a strong feeling in the country that a significant commitment by the US in Kyoto would be a good thing.

I'm also sending these results to Beth Viola, Tim Wirth, Todd Stern and TJ Glauthier.

10/17/97 draft copy - not for citation

Policies and Measures to Reduce CO2 Emissions in the United States

An Analysis of Options for 2005 and 2010

Tellus Institute and SEI-Boston
October 17, 1997

Abstract

The Intergovernmental Panel on Climate Change has unequivocally reported that in order to prevent global climate disruption and its attendant ecological, economic, geo-physical, demographic and political consequences, it is necessary to stabilize atmospheric concentrations of greenhouse gases well below the levels that would result if greenhouse gases continued to accumulate along current trends. Thus, to protect global climate, annual greenhouse gas emissions must be reduced by at least 60 percent below present emission rates. As the principal greenhouse gas is carbon dioxide, which is released in the energy production and use at the heart of industrial economies, this daunting objective will require two complementary sustained initiatives. First, the advanced industrial societies must dramatically reduce their carbon emissions from current levels. Second, industrializing nations must economically develop along a path of low carbon-intensity. Arguably, the United States, whose current per capita carbon emissions are roughly five times the present global average, must radically decrease emissions as its contribution to climate protection.

This study finds that the US can reduce its annual carbon emissions to **10 percent** below 1990 levels by 2005 and to **21 percent** below 1990 levels by 2010, at net savings to its economy relative to the present energy-intensive and fossil-based path. The US can achieve this by implementing an ambitious set of targeted policies, beginning in 1998, which would overcome market and institutional barriers and stimulate more rapid introduction of advanced technologies and fuels that are cleaner and more efficient. These near-term carbon reductions, and the technologies and policies that underlay them, establish a trajectory and a basis for the much deeper long-term cuts that are needed for climate protection.

This study was commissioned by the World Wildlife Fund (WWF) as a companion to parallel studies of the European Union (Blok *et al* 1996) and Japan (Morita *et al* 1997), which together with the US are responsible for roughly 40 percent of the world's annual carbon emissions. The study builds and expands upon another study – *Energy Innovations: A Prosperous Path to a Clean Environment* (EI 1997), which was recently released by five non-profit energy and environmental policy research organizations. This study strengthens, accelerates and adds to the policies identified and analyzed in *Energy Innovations*, to build an augmented policy package that more aggressively captures near-term carbon emissions reductions, in the time frame proposed by the Alliance of Small Island States (AOSIS).

I. Introduction and Summary

Background

At the 1992 Earth Summit in Rio de Janeiro, signatories to the Framework Convention on Climate Change committed themselves to achieving ...stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous interference with the climate system. Since that time, however, emissions of greenhouse gases have continued to rise, even as the community of climate scientists has moved toward the consensus that already human activities are having a discernible impact on global climate (IPCC 1996).

Annual carbon dioxide emissions of the industrialized countries are about 4 billion metric tons (a bit more than 3 tons per capita) including US emissions of about 1.5 billion tons (at 6 tons per capita), while the developing world releases about 2 billion tons (at about 0.5 ton per capita). Adequate response to the threat of global climate change will require stabilizing annual global carbon emissions at least 60 percent below current levels. However, under a business-as-usual future, in which no special attention is paid to the threat of climate change, overall annual emissions would likely *increase* from the current 6 billion tons to about 14 billion tons by 2050, driven by conventional economic development and a near doubling of population. Avoiding this path will require that two trajectories be established and sustained to reach the required global emissions of less than 2.5 billion tons; the industrialized world must reduce its annual carbon dioxide emissions from about 3 tons per capita (for the US, 6 tons per capita) to about one quarter ton per capita, and the industrializing world must be helped to achieve economic growth along a path of low carbon intensity.

Equity considerations aside (such as the current carbon accumulations owing to historic industrial development, which have nearly saturated the atmosphere's capacity to absorb additional carbon without inducing large-scale climate change; and the current imbalance in per capita emissions among nations), it is essential for climate protection that the industrialized countries take vigorous action to drive down their emissions towards the levels identified above, *no matter what action developing countries take*; the chief consideration affected by developing country action is how rapidly this must occur. Indeed, recognition of these facts is implied in the commitment to action by the industrialized world, prior to that of the developing world, in the Berlin Mandate.

The upcoming December, 1997 Conference of Parties to the FCCC in Kyoto offers a pivotal opportunity to make concerted progress toward this goal. Signatory states are obligated to formulate a greenhouse gas reduction regime in Kyoto, including quantified reduction targets and explicit timetables that will be legally binding on industrialized nations. The signatories will be considering the proposal offered by the Alliance of Small Island States (AOSIS), which targets a reduction in greenhouse gas emissions to 20 percent below to 1990 emissions by 2005, a reduction target already adopted by some nations as their individual targets but argued by others to be unrealistic (Blok *et al* 1996).

The present study, along with parallel studies for the European Union and Japan, has been commissioned by the World Wildlife Fund (WWF) to develop a set of concrete policies and measures for emissions reductions that could realistically approach the AOSIS' proposed 20 percent reduction target by 2005. Although very little time remains to achieve this, especially as current levels of emissions exceed considerably the 1990 benchmark, it is also

clear that tremendous potential exists for emissions reductions below projected business as usual levels.

This study has sought to identify policies and measures that (1) achieve significant carbon emissions reductions quickly, (2) are economical in the aggregate, owing to the energy-cost savings that are induced, even without considering greenhouse gas, pollution and ancillary benefits, and, perhaps most importantly, (3) serve as an effective transitional strategy that establishes a foundation and builds momentum toward the much deeper long-term emissions reductions required for climate protection.

Methodology

The analysis reported here builds and expands upon *Energy Innovations: A Prosperous Path to a Clean Environment* (EI 1997), a collaborative effort recently released by the Alliance to Save Energy, American Council for an Energy-efficient Economy, Natural Resources Defense Council, Tellus Institute, and Union of Concerned Scientists. The aim of *EI* was to formulate and model a set of targeted and complementary policies that would guide the US economy towards lower cost, less polluting, more secure, and more sustainable ways of producing and using energy. The *EI* methodology, which we have adopted and extended for the present study, consisted of translating the selected policies into technical and economic parameters that were then used as inputs to the Energy Information Administration's National Energy Modeling System (NEMS) as the primary analytical tool (EIA 1995). Supplemental analysis was done to compensate for limitations of NEMS, as mentioned in the sections below. Experts on the technologies for the residential, commercial, industrial, transportation and electricity generation sectors reviewed the detailed specifications used in NEMS and refined them as appropriate. This report borrows heavily from the original *EI* study, which was peer-reviewed by many leading US energy analysts.

This analytical approach is based on an integrated model that simultaneously considers the entire set of policies and models the direct impact of each policy along with the interactions among them. As this analytical approach yields results that are comprehensive and integrated, it is necessarily difficult to unambiguously attribute carbon reductions to specific policies or technology measures. Owing to the integrated nature of the analysis, individual measures have impacts that interact with one another, and have non-additive and sequence-dependent effects. In the sectoral descriptions below, we briefly describe the individual policies, give the modeling assumptions into which they translate, and report the resulting carbon reductions as aggregate figures for each sector. To the degree feasible, we also report the separate impacts of individual policies or groups of policies.

The baseline scenario considered in this study is essentially a "business as usual" projection, which was derived from the baseline scenario in *EI* by using updated fuel price projections (EIA, 1997). This projection assumes that there are continued modest improvements in the fuel economy of new vehicles, continued decline in industrial energy intensity, and continued penetration of more efficient equipment in buildings at historical rates. However, the steady increase in demand for energy services more than compensates for these improvements, and by 2005 energy consumption increases 20 percent and carbon emissions 17 percent above 1990 levels, rising further in 2010 to 24 percent and 22 percent,

respectively. (For further details regarding the baseline scenario see the respective sections below and *EI*.)

The policy-driven scenario developed in *EI* (dubbed the *Innovation Path* in that report) projects carbon emissions to fall below the 1990 benchmark by 6 percent in 2005 and 10 percent in 2010, both substantially short of the 20 percent reduction target proposed by AOSIS for 2005. However, owing to the policies of the *Innovation Path*, carbon emissions were projected to continue their decline, reaching the 20 percent reduction level by about 2015, and 45 percent by the 2030 horizon of the study.

It is interesting to note that the policies and measures modeled in the *Innovation Path* are roughly as effective as those developed for the European Union (EU) study commissioned by WWF (Blok 1996) -- each achieving a 19 percent reduction in emissions relative to its own baseline scenario projections for 2005. The lower reductions relative to 1990 found in *EI* reflect a quicker growth of baseline emissions in the US than in the EU, due in part to shifts from coal to gas made feasible by the comparable prices of these fuels in the EU.

The present study strengthens, accelerates and adds to the policies identified and analyzed in *Energy Innovations*, to build an augmented policy package that more aggressively captures near-term carbon emissions reductions. The key changes are acceleration of combined-heat-and-power (CHP) in the industrial sector, more rapid penetration of ethanol in blends with gasoline for transportation, and co-firing of biomass in coal-fired electric generation. The enhanced policy package achieves carbon emissions reductions to 10% below 1990 levels by 2005 and 21% below 1990 levels in 2010.

Policies

The *Climate Protection* scenario developed in this study is an integrated and balanced set of policies that can put the US on a path of technological diffusion and innovation towards an economically and environmentally sustainable future. The sector-specific policies and programs would guide the economy toward more efficient, lower cost, less polluting, more secure, and more sustainable production and consumption of energy. Some of the key policies are:

- *renewables content standards*, which would require increasing proportions of renewable resources for electricity and motor fuels, through credit-trading market mechanisms.

- *pollutant emissions caps*, which would limit SO_2, NO_X, particulates and CO_2 emissions in the electric power sector through allowance trading systems

- *biomass cofiring expansion*, which would quickly establish a significant amount of renewable energy in the electricity supply sector without requiring substantial investment in new power plants

- *an advanced vehicles initiative*, which would introduce stronger fuel economy and emissions standards along with pricing reform, incentives and demand management,

with the objective of encouraging the commercialization of clean and efficient vehicles and more environmentally benign travel patterns

• *investment tax credits*, which would speed the adoption of modern and energy-efficient technologies for new manufacturing equipment, through an incentive that is paid for by fees on energy purchases

• *research, development and technical support*, to ensure that innovation proceeds at a pace that makes improved energy-efficient and low-carbon technologies available more rapidly

• *regulatory reform*, to refine protocols and ensure market access, to fairly represent the economic and environmental benefits of industrial combined-heat-and-power (cogeneration) and, thereby, to speed its adoption by industrial firms

• *market transformation incentives*, including technology demonstrations, manufacture incentives, and consumer education, which would reduce transaction costs, help move products from prototype to commercial production, and lower the key hurdles between potential and realized energy savings

• *appliance and building standards*, which would establish norms for equipment, design and performance that, through purchases and practices, would reduce energy used in providing services in homes and offices

Details on these and additional policies in the *Climate Protection* scenario are provided in the relevant sections below.

Results

Carbon Reductions

The *Climate Protection* scenario developed here builds on the original *Innovation Path* (EI 1997) by implementing additional and strengthened policies in each sector to achieve deeper carbon reductions in the time-frame proposed by AOSIS. The policies and modeling results for each sector are described in the following sections. The combined effect of the more aggressive set of policies calculated in the integrated analyses is a 10 percent carbon reduction in 2005, which still falls short of the AOSIS target. However, reductions reach 21 percent by 2010, with excellent momentum towards deeper long-term reductions .

The carbon emissions of the baseline and *Climate Protection* scenarios are given in Figure 1. This figure reflects the separate and combined impacts of the sectoral policies -- in buildings, industry, transportation and electricity supply -- which induce decreases in energy-intensity through more efficient technologies, processes and practices, in addition to decreases in carbon-intensity through shifts to lower carbon energy sources and associated energy conversion facilities. The upper and lower curves give total carbon emissions for the two scenarios, while the shaded regions show the reductions from policies in each sector in succession. For this presentation, we adopt a convention for allocating electric sector emissions reductions that consists of first obtaining the reductions owing to electric supply

policies, which decrease the carbon-intensity of electric power generation, and then obtaining the further reductions from demand sector policies, which decrease the amount of power required. The latter reductions are allocated to the demand sectors in proportion to their demand reductions.

PRELIMINARY: Figure 1 shows baseline scenario carbon emissions reaching 1567 million metric tons (MTc) by 2005 and 1634 MTc by 2010, increases of 17 percent and 22 percent, respectively over the 1990 carbon emissions of 1338 MTc. The *Climate Protection* scenario projects carbon emissions that decrease to 1203 MTc in 2005 and 1061 MTc in 2010, reductions of 10 percent and 21 percent, respectively below 1990 emissions.

{Figure 1}

PRELIMINARY: *Economic Costs and Benefits*

On balance, the set of policies of the *Climate Protection* are estimated to be cost-effective by a significant margin, as shown in Figure 2, which provides cumulative discounted (present value) of costs, savings and net benefits through 2005 and 2010. Cumulative present value net benefits are almost $70 billion through 2005 and almost $200 billion through 2010. This magnitude of net economic benefits could be taken as leeway for yet more aggressive carbon reduction measures that have net incremental costs. However, the rather aggressive set of measures already embodied in the policy scenario of this study have costs per saved carbon-dioxide at the margin of about $60/ton; identifying realistic additional measures at a reasonable cost in the time-frame of this study is difficult; further improvements in efficiency and greater reliance on alternative energy sources before 2005 are constrained by the slow capital stock turnover in the four sectors. Rather than implementing more aggressive measures that might incur substantial cost, an effective longer-term strategy would involve implementing and sustaining the policies discussed here (or variations upon them) while committing substantial resources to R&D for broad classes of promising technologies that can provide the basis for the deeper long-term carbon emissions reductions needed to prevent global warming.

{Figure 2}

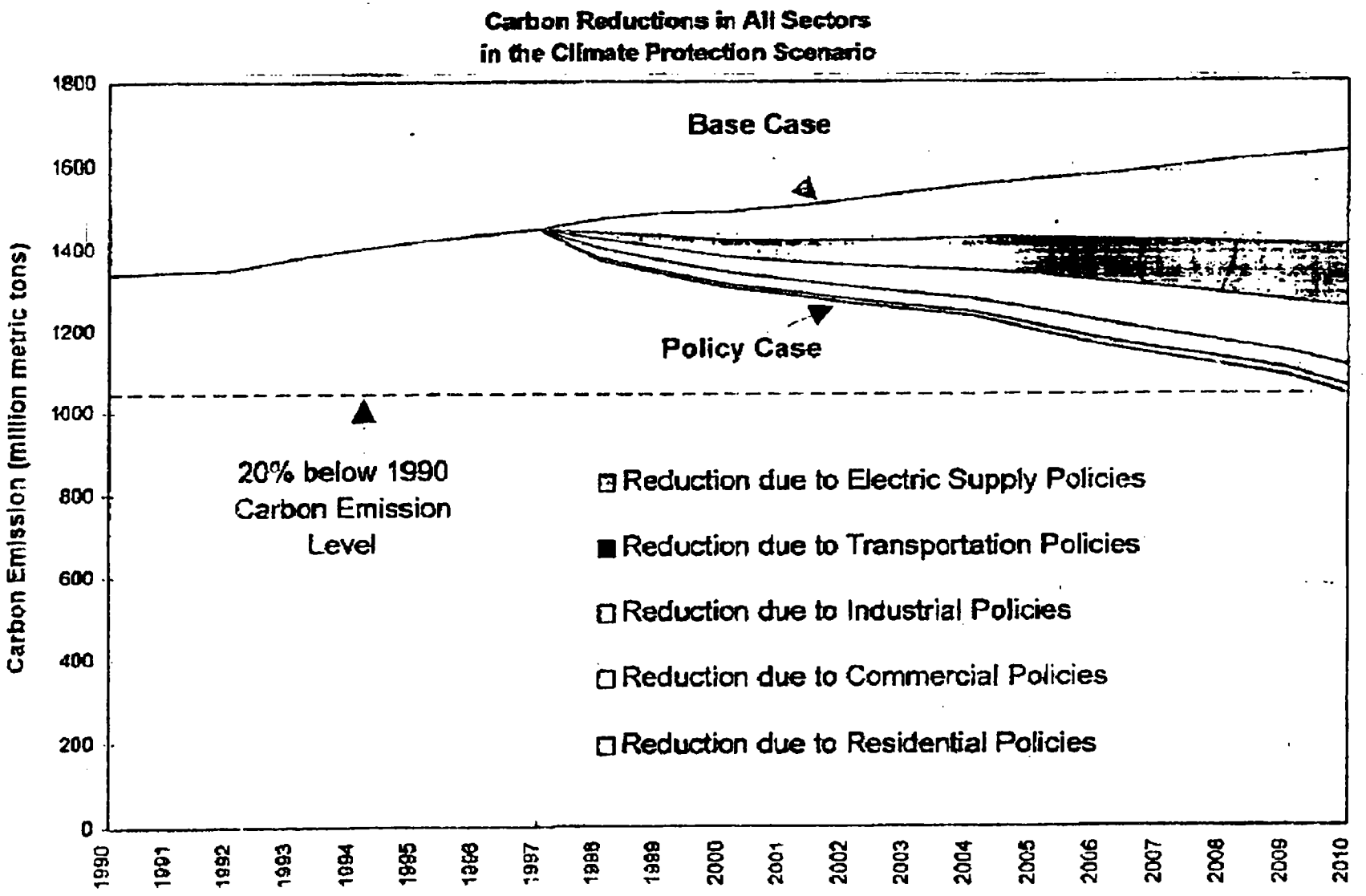

Fig 1

The Cumulative Present Value of Economy-Wide Costs, Savings and Net Benefits of the Climate Protection Scenario

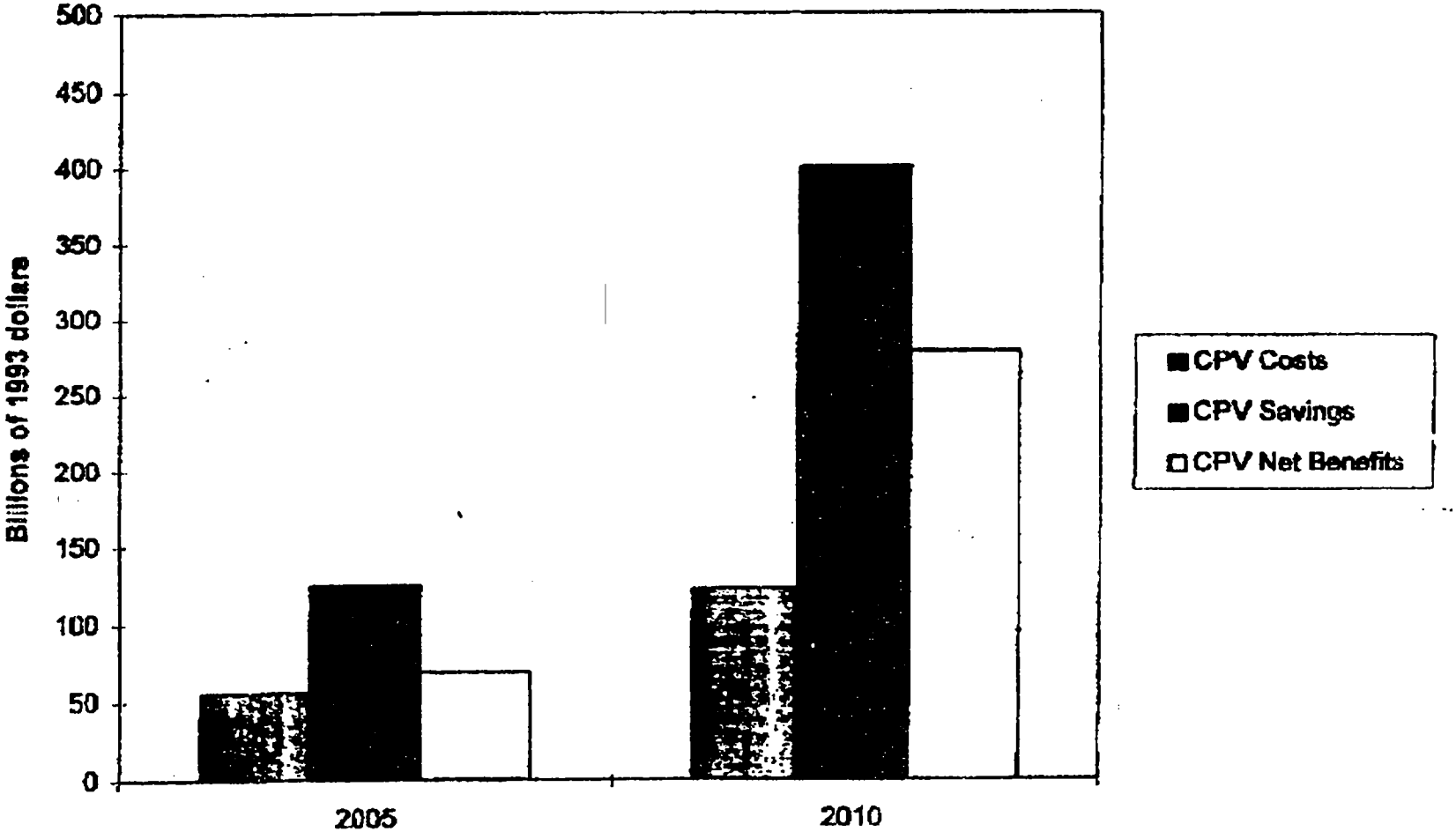

Fig 2

TO: World Wildlife Fund

FROM; The Mellman Group

RE: Support For Unilateral American Action To Curb Global Warming

DATE: October 9, 1997

This analysis reports the findings from a national survey of 1,012 adults who were interviewed by telephone October 3-7, 1997. The study is based on a random-digit dialing (RDD) probability sample of all telephone households in the continental United States which ensures that every telephone household had an equal chance of participating in the survey. The margin of error for the sample as a whole is +/- 3.1 percentage points at the 95% confidence level. The margin of error for subgroups varies and is larger.

Our previous survey provided the first comprehensive examination of public attitudes toward global warming. We found that while the issue may not be at the top of the public agenda, Americans nonetheless believe global warming is real and presents a serious threat. Also evident in that survey was a clear demand for action on the part of elected officials to curb carbon dioxide emissions. One piece of evidence for that public demand was the overwhelming support for an international treaty to reduce carbon emissions by 20% by the year 2005. Since then an intensive industry campaign has argued that the United States should not sign the treaty because it excludes the developing countries. Our latest survey was designed in part to test that argument.

The results are clear. A majority of Americans support unilateral action on the part of the United States to reduce its carbon dioxide emissions to help stop global warming. There is strong support for an international agreement among the industrialized countries to reduce carbon dioxide emissions by the year 2005. Support for such an agreement is even stronger when respondents are told how much of the world's carbon dioxide emissions are produced by the United States, other industrialized countries and the developing world.

Another goal of this briefer study was to re-examine support for proposals to achieve carbon dioxide reductions through emissions credit trading schemes. Our earlier survey described these proposals in ways some regarded as negative, and we found majorities opposed. In this survey we offered a positive phrasing of these proposals and find support to be mixed at best. More Americans support a proposal to reduce emissions by establishing a worldwide limit and allowing countries to cut their own emissions or contribute to other countries' efforts to do so,

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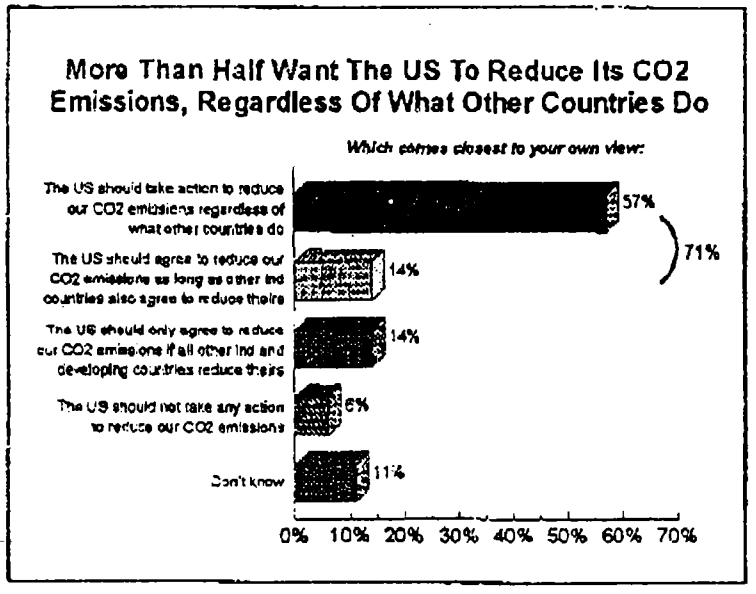
than support a similar plan for emissions reductions within the United States. However, neither proposal receives even majority support, let alone the overwhelming support found in our previous poll for regulatory action such as requiring cleaner burning engines in cars or requiring utilities to provide clean energy. Support for economic incentives, such as providing incentives to households to increase energy efficiency or to utility companies to sell clean energy, was also substantially greater than the support for trading proposals.

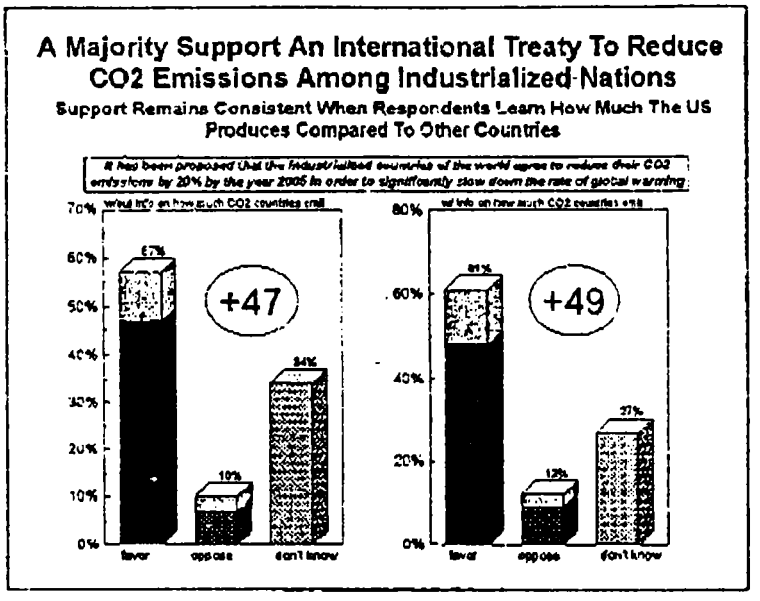
Americans Support Unilateral Action By The United States To Reduce Carbon Dioxide Emissions

Fully 71% of Americans believe that the United States and the other industrialized countries of the world should agree to reduce carbon dioxide emissions **irrespective of what the developing countries do**. Indeed, more than half of Americans (57%) say that the United States should take action to reduce emissions **regardless** of what **any** other countries do. Despite an aggressive industry advertising campaign, only 14% believe that the United States should not agree to carbon dioxide emission reductions unless all the industrialized and all the developing countries agree to reduce their emissions. A mere 6% say the U.S. should do nothing to curb its carbon emissions. The view that the United States should take action in this regard cuts across demographic and geographic groups, with those living in the West (65%) supporting unilateral action most strongly.



Americans Support A Treaty Among The Industrialized Nations

A majority of Americans (57%) support an international treaty to reduce carbon dioxide emissions by just the industrialized nations (47% strong support). A mere ten percent oppose such a treaty, while 34% are undecided. Another half of the respondents were also told that the United States has 4% of the world's population and produces 22% of the world's carbon dioxide emissions, the rest of the industrialized world produces 38%, and the developing countries produce 40% of the world's carbon dioxide emissions. Among this group, support for an agreement among the industrialized countries is 61%, while only 12% are opposed and 27% are undecided.



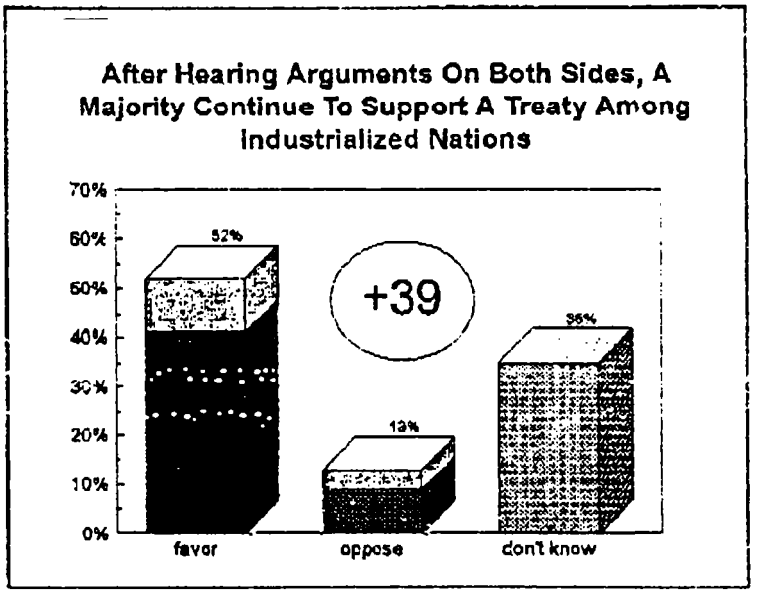
Support for a treaty among the industrialized countries to limit carbon dioxide emissions remains strong even after respondents hear arguments for and against such a treaty. Respondents were read two arguments. One argued against the treaty saying:

"making these reductions will mean much higher gas taxes, half a million lost jobs a year and will mean making major changes to our lifestyle. Opponents say that this treaty is not global because developing countries don't have to reduce their carbon dioxide emissions at all."

The other statement argued that:

"because the United States and the rest of the industrialized countries produced most of the carbon dioxide, we have a responsibility to limit carbon emissions no matter what other countries do. Supporters say these limits will help stop the effects of global warming which is causing increased respiratory problems, extreme weather and the destruction of animals and their habitats. They say the technology already exists to reduce carbon dioxide emissions without increasing taxes or costing jobs."

After hearing both arguments, still 52% support a treaty to limit emissions among industrialized nations, 13% oppose the treaty and just over a third (35%) are undecided.



Americans Are Mixed On Emissions Credit-Trading Proposals

Voters are evenly divided on a proposal to reduce carbon dioxide emissions in the United States by establishing a total limit on emissions and allowing businesses to bid for emission credits which they can then trade in order to choose between reducing their own emissions or paying other companies to reduce theirs in order to meet the overall limit more cheaply. One-third (33%) support such a proposal, while 34% oppose and 33% are undecided. There is slightly more support for a similarly structured global proposal which would give countries the right to discharge carbon dioxide up to a limit and trade their emissions credits with one another. Forty percent (40%) of Americans support such a plan, while 31% are opposed and 29% are undecided.

Our earlier poll asked similar questions; however, these particular proposals were framed as allowing companies and countries to bid for the "rights to pollute" -- what some regarded as a negative description of the proposals. In this survey these proposal were described more positively as "carbon emission credits." Support for the "carbon emission credits" proposals (within U.S. 34% oppose, 33% favor; worldwide 31% oppose, 40% favor) is greater than for "pollution rights" proposals (within U.S. 57% oppose, 29% favor; worldwide 56% oppose, 32% favor), though this support is still mixed at best. Thus, support for emissions credit proposals seems to be sensitive to how the proposals are described. While "pollution rights" are reviled, "carbon emission credits" generate a more even division. At the same time, even when framed very positively, these solutions are still far less popular than regulatory action or incentives. In substantial numbers Americans favor regulatory action to curb emissions such as requiring cleaner burning engines in cars (86% favor) or requiring utilities to offer clean energy (82% favor). They also strongly support incentives to help reduce emissions, such as incentives to households for energy efficient appliances (85% favor) and incentives to utility companies to encourage the sale of clean energy (81% favor).

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DEPARTMENT OF ENERGY
Washington, DC 20585

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Distribution Category UC-950

Emissions of Greenhouse Gases in the United States 1996

October 1997

Energy Information Administration
Office of Integrated Analysis and Forecasting
U.S. Department of Energy
Washington, DC 20585

Preface

Title XVI, Section 1605(a) of the Energy Policy Act of 1992 (enacted October 24, 1992) provides:

> *Not later than one year after the date of the enactment of this Act, the Secretary, through the Energy Information Administration, shall develop, based on data available to, and obtained by, the Energy Information Administration, an inventory of the national aggregate emissions of each greenhouse gas for each calendar year of the baseline period of 1987 through 1990. The Administrator of the Energy Information Administration shall annually update and analyze such inventory using available data. This subsection does not provide any new data collection authority.*

The first report in this series, *Emissions of Greenhouse Gases 1985-1990*, was published in September 1993. This report—the fifth annual report, as required by law—presents the Energy Information Administration's latest estimates of emissions for carbon dioxide, methane, nitrous oxide, and other greenhouse gases.

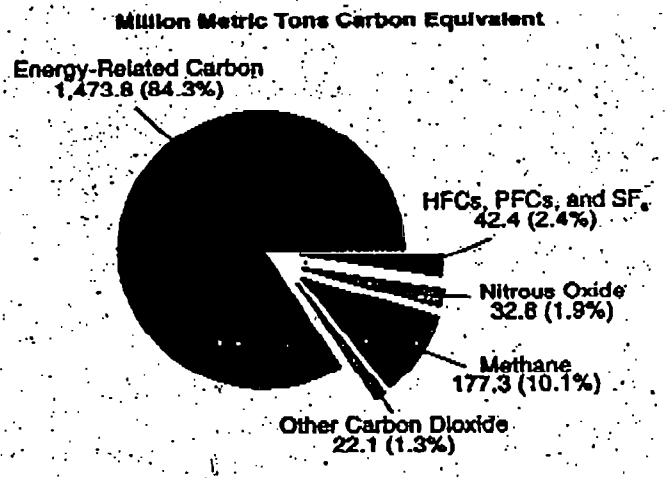
Executive Summary

In 1996, U.S. emissions of greenhouse gases increased by 3.4 percent over 1995 emissions, the highest rate of increase in recent years. Although U.S. emissions have been growing since 1991, their growth accelerated in 1996. Greenhouse gas emissions expanded more rapidly than U.S. energy consumption in 1996, and the growth of energy consumption (up 3.2 percent) exceeded the growth of the U.S. economy (up 2.4 percent).[1] Three principal sources contributed to the growth in U.S. greenhouse gas emissions:

- Energy consumption increased more rapidly in 1996 than in recent years, buoyed by strong economic growth and unusually severe weather. Residential and commercial carbon dioxide emissions (including their prorated share of electric utility emissions) expanded by 6.3 and 5.5 percent, respectively.
- The rapid growth of relatively low-carbon natural gas consumption, which has tended to moderate the growth of total carbon dioxide emissions in recent years by "capping" high-carbon coal use, slowed as natural gas prices increased. Consequently, electric utilities met the demand for increased electricity largely with coal-fired power generation. Electric utility carbon dioxide emissions increased by 4.7 percent, divided between a 2.4-percent rise resulting from increased electricity sales and a 2.3-percent increase resulting from the use of fuels with higher carbon content.
- Estimated emissions of exotic gases, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride—paced by increased emissions of HFC-134a, the widely accepted substitute for chlorofluorocarbons (CFCs)—grew by more than 10 percent in 1996, though from very low levels.

Table ES1 shows trends in emissions of the principal greenhouse gases, measured in million metric tons of gas. In Table ES2, the value shown for each gas is weighted by its global warming potential (GWP), which is as a measure of radiative forcing. This concept, developed by the Intergovernmental Panel on Climate Change (IPCC),[2] provides a comparative measure of the impacts of different greenhouse gases on global warming, with the effect of carbon dioxide being equal to 1 (see "Units for Measuring Greenhouse Gases" on page 5). The GWPs for other greenhouse gases are considerably higher (see discussion in Chapter 1). Overall, GWP-weighted emissions rose by 8.3 percent between 1990 and 1996 and by 3.4 percent between 1995 and 1996. On a GWP-weighted basis, carbon dioxide emissions account for 85 percent of U.S. greenhouse gas emissions (Figure ES1). While carbon dioxide emissions are growing, methane and nitrous oxide emissions have been roughly stable.

Figure ES1. U.S. Greenhouse Gas Emissions by Gas, 1996



Source: EIA estimates documented in this report.

Table ES2 excludes several radiatively important gases: the criteria pollutants carbon monoxide, nitrogen oxides, and particulates, as well as CFCs and hydrochlorofluorocarbons (HCFCs). These gases have ambiguous effects on climate, which are difficult to quantify. In addition, CFCs and HCFCs are specifically excluded from coverage under the international climate treaty, the Framework Convention on Climate Change. (See Chapters 1, 5, and 6 for discussion related to the effects and emissions of these gases.)

[1] Energy Information Administration, *Annual Energy Review 1996*, DOE/EIA-0384(96) (Washington, DC, July 1997), pp. 5 and 367.
[2] Intergovernmental Panel on Climate Change, *Climate Change 1995: The Science of Climate Change* (Cambridge, UK: Cambridge University Press, 1996).

The historical emissions estimates for the years 1989 through 1995 presented in this report are only slightly revised from those in last year's report (see the box on page 2, "What's New in This Report").

Table ES1. Estimated U.S. Emissions of Greenhouse Gases by Gas, 1989-1996
(Million Metric Tons of Gas)

Gas	1989	1990	1991	1992	1993	1994	1995	P1996
Carbon Dioxide	5,091.8	5,037.1	4,987.3	5,058.8	5,175.9	5,256.1	5,296.9	5,484.9
Methane	31.3	31.6	31.6	31.7	30.8	31.4	30.9	30.9
Nitrous Oxide	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4
Halocarbons and Minor Gases								
CFC-11, CFC-12, CFC-113	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1
HCFC-22	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
HFCs, PFCs, and SF_6	*	*	*	*	*	*	*	*
Methyl Chloroform	0.3	0.3	0.2	0.2	0.1	0.1	*	*
Criteria Pollutants								
Carbon Monoxide	93.5	91.3	88.3	85.3	85.4	89.6	83.5	NA
Nitrogen Oxides	21.1	20.9	20.6	20.7	21.1	21.5	19.7	NA
Nonmethane VOCs	21.7	21.4	20.8	20.3	20.5	21.1	20.7	NA

*Less than 50,000 tons of gas. Estimated hydrofluorocarbon, perfluorocarbon, and sulfur hexafluoride emissions combined totaled 0.008 million metric tons in 1989, rising to 0.034 million metric tons in 1996.

P = preliminary data. NA = not available.

Note: Data in this table are revised from the data contained in the previous EIA report, *Emissions of Greenhouse Gases in the United States 1995*, DOE/EIA-0573(95) (Washington, DC, October 1996).

Sources: **Carbon dioxide, methane, nitrous oxide emissions:** EIA estimates described in Chapters 2, 3, and 4 of this report. **Halocarbons and minor gases:** 1990 and 1994 estimates from the U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-1994*, EPA-230-R-96-006 (Washington, DC, November 1995), pp. 46-50. Other years from EIA estimates described in Chapter 5 of this report. **Criteria pollutants:** U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Pollutant Emission Trends, 1900-1995*, EPA-454/R-96-007 (Research Triangle Park, NC, October 1996), Tables A-1–A-3, pp. A-2–A-16.

Table ES2. U.S. Emissions of Greenhouse Gases, Based on Global Warming Potential, 1989-1996
(Million Metric Tons of Carbon or Carbon Equivalent)

Gas	1989	1990	1991	1992	1993	1994	1995	P1996
Carbon	1,389	1,374	1,360	1,380	1,412	1,433	1,445	1,496
Methane	179	181	181	182	177	180	177	177
Nitrous Oxide	38	38	38	38	39	40	38	38
HFCs, PFCs, and SF_6	26	25	26	28	27	31	36	42
Total	1,632	1,618	1,606	1,628	1,654	1,684	1,696	1,753

P = preliminary data.

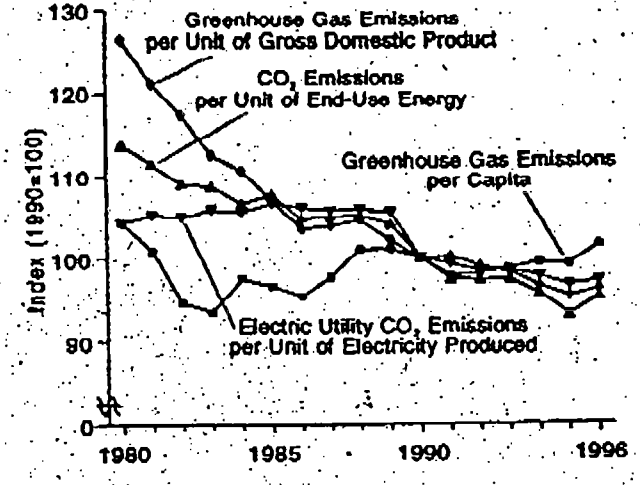
Note: Data in this table are revised from the data contained in the previous EIA report, *Emissions of Greenhouse Gases in the United States 1995*, DOE/EIA-0573(95) (Washington, DC, October 1996).

Sources: EIA estimates documented in this report.

Carbon Dioxide

Some 98.5 percent of U.S. anthropogenic carbon dioxide emissions come from the combustion of fossil fuels. Changes in carbon dioxide emissions can be traced to energy consumption trends and changes in the composition of fossil fuels burned to provide energy services. During the 1980s and early 1990s, the energy intensity of the U.S. economy and the carbon intensity of U.S. energy consumption steadily declined (Figure ES2).

Figure ES2. Emissions Intensity of U.S. Gross Domestic Product, Population, Energy Use, and Electricity Production, 1980-1996



Sources: EIA estimates documented in this report.

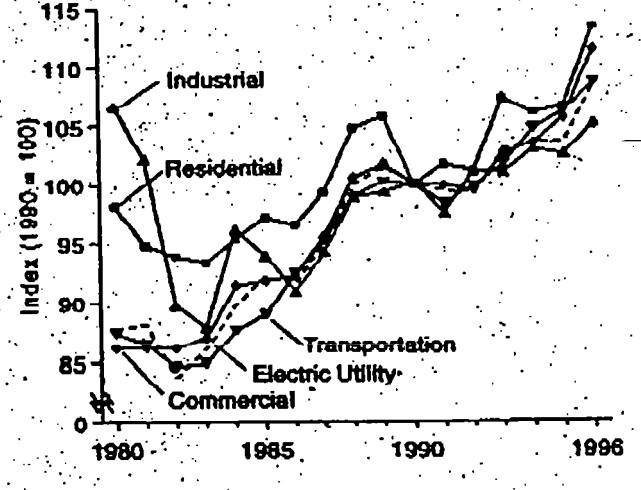
Several unrelated factors caused the decline:

- The deregulation of the natural gas industry bore fruit in the form of greatly increasing gas supplies at low prices. Natural gas use expanded rapidly in the residential, commercial, and industrial sectors, accounting for much of the growth of energy consumption.
- Many events of the period—including the Gulf War, the oil price spike of 1990, the recession of 1991, and the vogue for utility demand-side management programs—tended to restrain the growth of energy consumption.
- Utility operators began to solve nuclear power plant operating problems and, by 1995, were able to produce 17 percent more electricity from nuclear plants than in 1990.
- With more snowfall in the Pacific Northwest, hydroelectric power generation has returned to the levels of the early 1980s. Despite widespread allocation of water to accommodate salmon, 1996 hydroelectric generation was the second highest on record.

Currently, however, the growth in nuclear power generation has leveled off, and it is unlikely that future hydroelectric generation will often match 1996 levels. World oil prices remain relatively low, and the U.S. economy is growing rapidly.

Severe weather conditions in 1996 produced a series of anomalous results: residential and commercial natural gas consumers used 7.8 percent more natural gas and 3.5 percent more electricity than in 1995, and natural gas prices increased sharply. In response to the price signals, electric utilities reduced their gas consumption by 15 percent and substituted coal. The result was a sharp increase in both total carbon emissions and emissions per kilowatthour for the electric utility sector, accompanied by rapid increases in both direct (from natural gas and heating oil) and indirect (from electricity) emissions from the residential and commercial sectors. Emissions from the industrial and transportation sectors increased by a "more normal" 2.6 percent and 2.3 percent, respectively, in 1996 (Figure ES3).

Figure ES3. U.S. Carbon Dioxide Emissions by Sector, 1980-1996



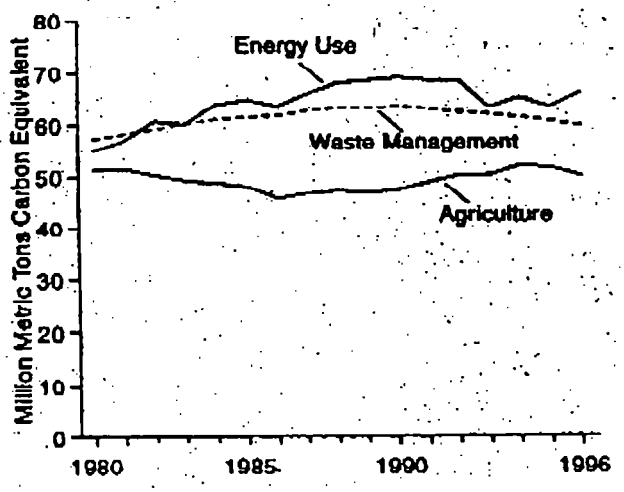
Source: EIA estimates documented in Chapter 2 of this report.

Methane

Methane emissions estimates are more uncertain than those for carbon dioxide. U.S. anthropogenic methane emissions have three principal sources: production and transportation of coal, natural gas, and oil; anaerobic decomposition of municipal waste in landfills; and

raising livestock. Smaller sources include combustion of fossil fuels, rice cultivation, and industrial processes. Estimated 1996 methane emissions are unchanged from emissions in 1995 (Figure ES4).

Figure ES4. U.S. Methane Emissions by Source, 1980-1996



Source: EIA estimates documented in Chapter 3 of this report.

Note: Methane emissions from industrial sources were approximately 750,000 metric tons in 1996.

Methane emissions rose during the late 1980s. The principal cause appears to have been increased production from a group of underground coal mines with very high rates of methane emissions. Meanwhile, emissions from municipal landfills appear to have been stable, because growth in the volume of solid waste generated was offset by a growing volume of waste burned for energy recovery and by increased recovery of methane at landfill sites.

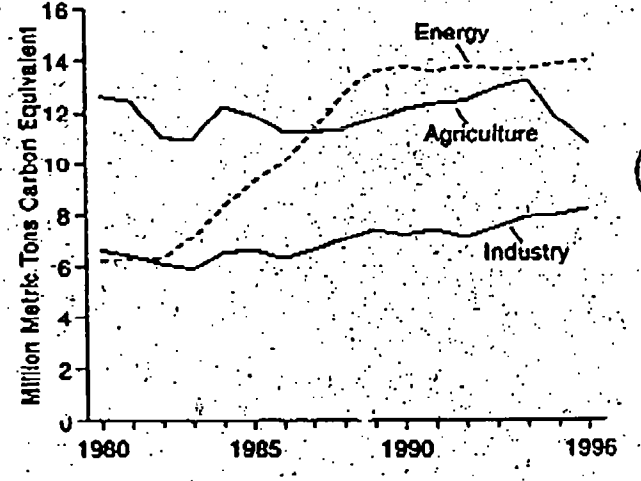
In the 1990s, several factors have tended to limit or reduce estimated methane emissions:

- The rapid expansion of recycling (particularly of paper and garden cuttings) and "waste-to-energy" plants has reduced the volume of material going into landfills. The expansion of landfill methane capture projects (both for energy and emissions control), although much slower, has reduced methane emissions from existing sources.
- Coal mine methane emissions are dominated by a relatively small group of underground coal mines. While the coal industry as a whole has been increasing output in recent years, these mines have suffered from vicissitudes particular to their locations, production economics, and the grades of coal they produce. Output from these mines does not necessarily track with national trends. Further, a number of them have introduced methane capture programs, which have also reduced emissions.

Nitrous Oxide

Nitrous oxide emissions estimates are more uncertain than estimates of methane emissions, and the uncertainty of the estimation methods makes it difficult to be confident of apparent trends. The principal sources are believed to be "excess" emissions from agricultural soils associated with fertilizer use, industrial process emissions, and emissions from combustion of fossil fuels. Nitrous oxide emissions, estimated at 0.45 million metric tons in 1996, are essentially unchanged since 1990. Declining agricultural emissions (due to reduced use of nitrogen fertilizers) have offset slowly increasing energy-related and industrial emissions (Figure ES5).

Figure ES5. U.S. Nitrous Oxide Emissions by Source, 1980-1996



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Halocarbons and Related Compounds

Halocarbons and related compounds include chlorofluorocarbons (CFCs), hydrochlorofluorocarbons (HCFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and other compounds that act as greenhouse gases. Halocarbons have many uses, but most emissions come from their use as refrigerants in cooling equipment, as solvents, or as blowing agents and from fugitive emissions in industrial processes.

CFCs are currently being phased out because they damage the stratospheric ozone layer. The warming effects of CFCs and HCFCs are offset to some extent because they also destroy ozone, which is a potent greenhouse gas. Compounds that contain no chlorine (such as HFCs and PFCs) do not affect ozone, and their effects on climate are therefore easier to measure.

The available data suggest that emissions of CFCs—about 0.2 million metric tons in 1990—are declining. Estimated HCFC emissions (almost entirely HCFC-22, a popular refrigerant for home air conditioners) have been largely stable since 1993. There is little information about emissions of "new" HCFCs, such as HCFC-141b and HCFC-142b, which are CFC substitutes.

HFC emissions were very low—perhaps 0.006 million metric tons—in 1990. Emissions of HFC-23, a byproduct of HCFC-22 production, have also been roughly stable since 1993. Emissions of the CFC substitutes HFC-134a and HFC-152 have risen substantially in the past 3 years, from a base total of less than 0.001 million metric tons in 1990 (Figure ES6). HFC-134a became the standard automobile air conditioner refrigerant in 1994, and emissions will grow rapidly as CFCs are replaced throughout the automobile fleet. Consumption of HFC-152 is growing rapidly, but it has a relatively low global warming potential of 140.

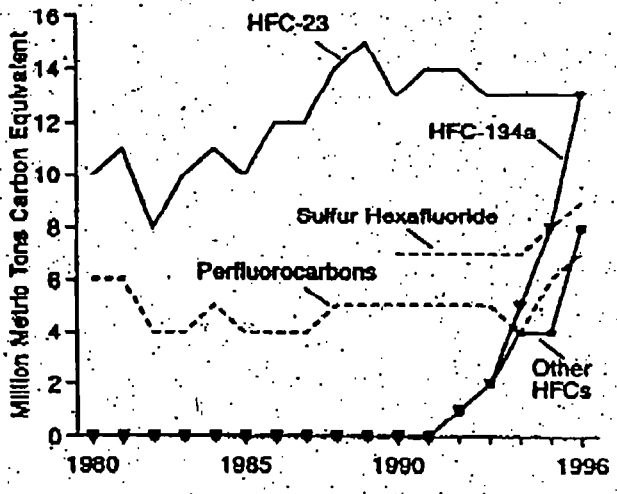
The principal quantifiable source of PFCs is as a fugitive emission from aluminum smelting. Aluminum smelting rebounded in 1996, after declining in the early 1990s, increasing the estimated emissions of PFCs. In recent years, several PFCs have found markets in the semiconductor industry, but it has proved difficult to obtain reliable information about sales and consumption, other than that the numbers are relatively small.

Another compound included in this category is sulfur hexafluoride, which is used primarily as an insulating gas in electrical switchgear. The amounts used are uncertain but appear to be quite small (around 1,000 metric tons per year); however, sulfur hexafluoride has an extremely high global warming potential (around 25,000), and, hence, even small emissions have disproportionate consequences.

Criteria Pollutants

Criteria pollutants (carbon monoxide, nitrogen oxides, and nonmethane volatile organic compounds) are reactive gases that usually decay quickly in the atmosphere. They are not necessarily greenhouse gases themselves, but they can promote atmospheric chemical reactions that create tropospheric ozone, which is a potent greenhouse gas. Because the ozone-creating effect of these gases varies with local atmospheric conditions, it is not possible to compute their effects directly. As precursors to urban "smog," their emissions are regulated under the Clean Air Act. The principal source of emissions of criteria pollutants is the combustion of fossil fuels, particularly in motor vehicles.

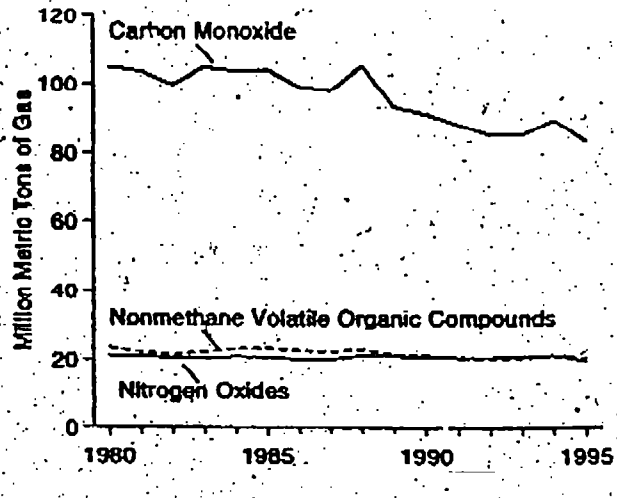
Figure ES6. U.S. Emissions HFCs, PFCs, and Sulfur Hexafluoride, 1980-1996



Source: EIA estimates documented in Chapter 5 of this report.

According to estimates from the U.S. Environmental Protection Agency, national-level emissions of carbon monoxide have been declining since the late 1970s (Figure ES7). Emissions of nonmethane volatile organic

Figure ES7. U.S. Emissions of Selected Criteria Pollutants, 1980-1995



Source: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Pollutant Emission Trends, 1900-1995*, EPA-454/96-007 (Research Triangle Park, NC, October 1996), Tables A-1–A-11, pp. A-2–A-16.

compounds and nitrogen oxides have been essentially unchanged in recent years.

Land Use Issues

Changes in land use can also have large, though difficult to quantify, effects on atmospheric concentrations of greenhouse gases. In the United States, the expansion of forest land and the growth of existing forests are responsible for removing large amounts of carbon from the atmosphere. Several studies of carbon sequestration in U.S. forests suggest that in the late 1980s and early 1990s, some 111 to 238 million metric tons of carbon was sequestered annually, equivalent to about 8 to 17 percent of U.S. anthropogenic carbon emissions.[3] However, considerable uncertainty is associated with this estimate—particularly with the amount of carbon sequestered in forest soils.

The IPCC recommends including emissions and sequestration from land use changes in national inventories, and the U.S. "National Communication" for the Framework Convention follows this practice.[4] The EIA, however, has elected not to include carbon sequestration from forestry in its "total" estimate of U.S. emissions, for the following reasons:

- There is insufficient information to determine the extent, if any, of year-to-year changes in anthropogenic sequestration of carbon. Changes in national sequestration rates can be estimated only at 5-year intervals. The current estimate is an annual average for the period 1987-1992; new data will become available in 1998, covering the 1992-1997 period.
- The magnitude of the sequestration estimate is subject to considerable uncertainty on several counts. The largest source of uncertainty is the amount of carbon sequestered annually in forest soils.

[3]R.A. Birdsey and L.S. Heath, "Carbon Changes in U.S. Forests," in L.A. Joyce (ed.), *Productivity of America's Forests and Climate Change* (Fort Collins, CO: USDA Forest Service, General Technical Report RM-GTR-271, 1995).

[4]U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1993*, EPA-230-R-94-014 (Washington, DC, September 1994), p. ES-7.

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Emissions of Greenhouse Gases in the United States 1996

October 1997

Energy Information Administration
Office of Integrated Analysis and Forecasting
U.S. Department of Energy
Washington, DC 20585

Preface

Title XVI, Section 1605(a) of the Energy Policy Act of 1992 (enacted October 24, 1992) provides:

> *Not later than one year after the date of the enactment of this Act, the Secretary, through the Energy Information Administration, shall develop, based on data available to, and obtained by, the Energy Information Administration, an inventory of the national aggregate emissions of each greenhouse gas for each calendar year of the baseline period of 1987 through 1990. The Administrator of the Energy Information Administration shall annually update and analyze such inventory using available data. This subsection does not provide any new data collection authority.*

The first report in this series, *Emissions of Greenhouse Gases 1985-1990*, was published in September 1993. This report—the fifth annual report, as required by law—presents the Energy Information Administration's latest estimates of emissions for carbon dioxide, methane, nitrous oxide, and other greenhouse gases.

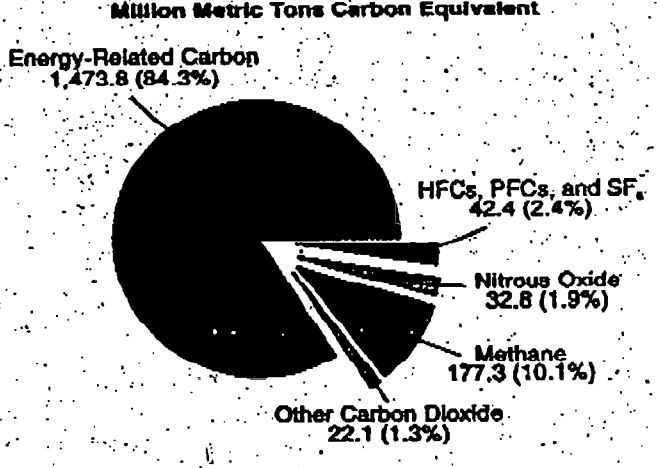
Executive Summary

In 1996, U.S. emissions of greenhouse gases increased by 3.4 percent over 1995 emissions, the highest rate of increase in recent years. Although U.S. emissions have been growing since 1991, their growth accelerated in 1996. Greenhouse gas emissions expanded more rapidly than U.S. energy consumption in 1996, and the growth of energy consumption (up 3.2 percent) exceeded the growth of the U.S. economy (up 2.4 percent).[1] Three principal sources contributed to the growth in U.S. greenhouse gas emissions:

- Energy consumption increased more rapidly in 1996 than in recent years, buoyed by strong economic growth and unusually severe weather. Residential and commercial carbon dioxide emissions (including their prorated share of electric utility emissions) expanded by 6.3 and 5.5 percent, respectively.
- The rapid growth of relatively low-carbon natural gas consumption, which has tended to moderate the growth of total carbon dioxide emissions in recent years by "capping" high-carbon coal use, slowed as natural gas prices increased. Consequently, electric utilities met the demand for increased electricity largely with coal-fired power generation. Electric utility carbon dioxide emissions increased by 4.7 percent, divided between a 2.4-percent rise resulting from increased electricity sales and a 2.3-percent increase resulting from the use of fuels with higher carbon content.
- Estimated emissions of exotic gases, such as hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride—paced by increased emissions of HFC-134a, the widely accepted substitute for chlorofluorocarbons (CFCs)—grew by more than 10 percent in 1996, though from very low levels.

Table ES1 shows trends in emissions of the principal greenhouse gases, measured in million metric tons of gas. In Table ES2, the value shown for each gas is weighted by its global warming potential (GWP), which is as a measure of radiative forcing. This concept, developed by the Intergovernmental Panel on Climate Change (IPCC),[2] provides a comparative measure of the impacts of different greenhouse gases on global warming, with the effect of carbon dioxide being equal to 1 (see "Units for Measuring Greenhouse Gases" on page 5). The GWPs for other greenhouse gases are considerably higher (see discussion in Chapter 1). Overall, GWP-weighted emissions rose by 8.3 percent between 1990 and 1996 and by 3.4 percent between 1995 and 1996. On a GWP-weighted basis, carbon dioxide emissions account for 85 percent of U.S. greenhouse gas emissions (Figure ES1). While carbon dioxide emissions are growing, methane and nitrous oxide emissions have been roughly stable.

Figure ES1. U.S. Greenhouse Gas Emissions by Gas, 1996



Source: EIA estimates documented in this report.

Table ES2 excludes several radiatively important gases: the criteria pollutants carbon monoxide, nitrogen oxides, and particulates, as well as CFCs and hydrochlorofluorocarbons (HCFCs). These gases have ambiguous effects on climate, which are difficult to quantify. In addition, CFCs and HCFCs are specifically excluded from coverage under the international climate treaty, the Framework Convention on Climate Change. (See Chapters 1, 5, and 6 for discussion related to the effects and emissions of these gases.)

[1]Energy Information Administration, *Annual Energy Review 1996*, DOE/EIA-0384(96) (Washington, DC, July 1997), pp. 5 and 367.
[2]Intergovernmental Panel on Climate Change, *Climate Change 1995: The Science of Climate Change* (Cambridge, UK: Cambridge University Press, 1996).

The historical emissions estimates for the years 1989 through 1995 presented in this report are only slightly revised from those in last year's report (see the box on page 2, "What's New in This Report").

Table ES1. Estimated U.S. Emissions of Greenhouse Gases by Gas, 1989-1996
(Million Metric Tons of Gas)

Gas	1989	1990	1991	1992	1993	1994	1995	P1996
Carbon Dioxide	5,091.8	5,037.1	4,987.3	5,058.8	5,175.9	5,256.1	5,296.9	5,484.9
Methane	31.3	31.6	31.6	31.7	30.8	31.4	30.9	30.9
Nitrous Oxide	0.4	0.4	0.5	0.5	0.5	0.5	0.5	0.4
Halocarbons and Minor Gases								
CFC-11, CFC-12, CFC-113	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1
HCFC-22	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
HFCs, PFCs, and SF_6	*	*	*	*	*	*	*	*
Methyl Chloroform	0.3	0.3	0.2	0.2	0.1	0.1	*	*
Criteria Pollutants								
Carbon Monoxide	93.5	91.3	88.3	85.3	86.4	89.6	83.5	NA
Nitrogen Oxides	21.1	20.9	20.6	20.7	21.1	21.5	19.7	NA
Nonmethane VOCs	21.7	21.4	20.8	20.3	20.5	21.1	20.7	NA

*Less than 50,000 tons of gas. Estimated hydrofluorocarbon, perfluorocarbon, and sulfur hexafluoride emissions combined totaled 0.008 million metric tons in 1989, rising to 0.034 million metric tons in 1996.

P = preliminary data. NA = not available.

Note: Data in this table are revised from the data contained in the previous EIA report, *Emissions of Greenhouse Gases in the United States 1995*, DOE/EIA-0573(95) (Washington, DC, October 1996).

Sources: **Carbon dioxide, methane, nitrous oxide emissions:** EIA estimates described in Chapters 2, 3, and 4 of this report. **Halocarbons and minor gases:** 1990 and 1994 estimates from the U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990-1994*, EPA-230-R-96-006 (Washington, DC, November 1995), pp. 46-50. Other years from EIA estimates described in Chapter 5 of this report. **Criteria pollutants:** U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Pollutant Emission Trends, 1900-1995*, EPA-454/R-96-007 (Research Triangle Park, NC, October 1996), Tables A-1–A-3, pp. A-2–A-16.

Table ES2. U.S. Emissions of Greenhouse Gases, Based on Global Warming Potential, 1989-1996
(Million Metric Tons of Carbon or Carbon Equivalent)

Gas	1989	1990	1991	1992	1993	1994	1995	P1996
Carbon	1,389	1,374	1,360	1,380	1,412	1,433	1,445	1,496
Methane	179	181	181	182	177	180	177	177
Nitrous Oxide	38	38	38	38	39	40	38	38
HFCs, PFCs, and SF_6	26	25	26	28	27	31	36	42
Total	1,632	1,618	1,606	1,628	1,654	1,684	1,696	1,753

P = preliminary data.

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Carbon Dioxide

Some 98.5 percent of U.S. anthropogenic carbon dioxide emissions come from the combustion of fossil fuels. Changes in carbon dioxide emissions can be traced to energy consumption trends and changes in the composition of fossil fuels burned to provide energy services. During the 1980s and early 1990s, the energy intensity of the U.S. economy and the carbon intensity of U.S. energy consumption steadily declined (Figure ES2).

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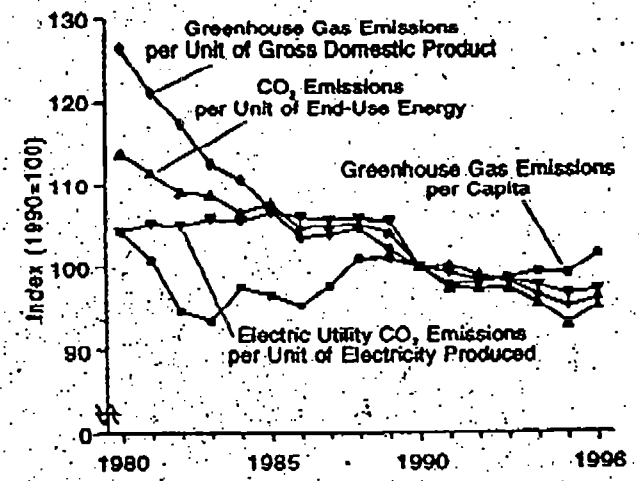

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Several unrelated factors caused the decline:

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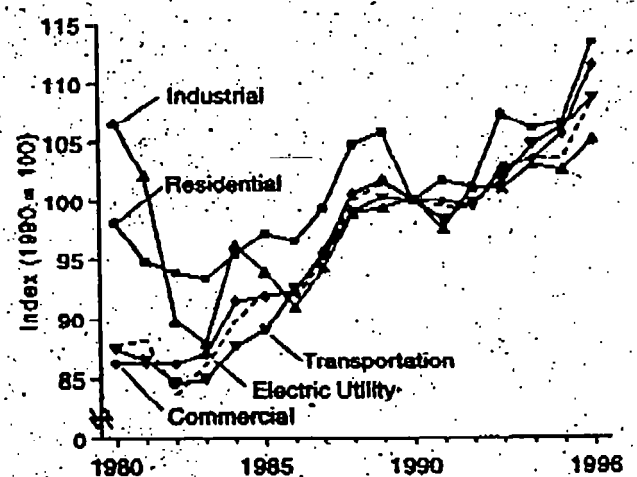

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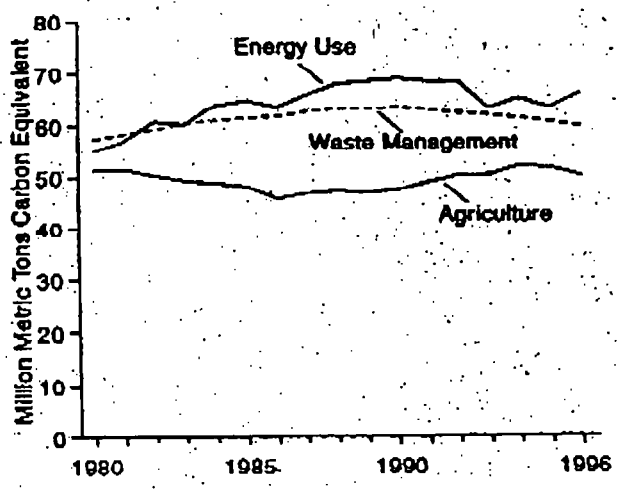

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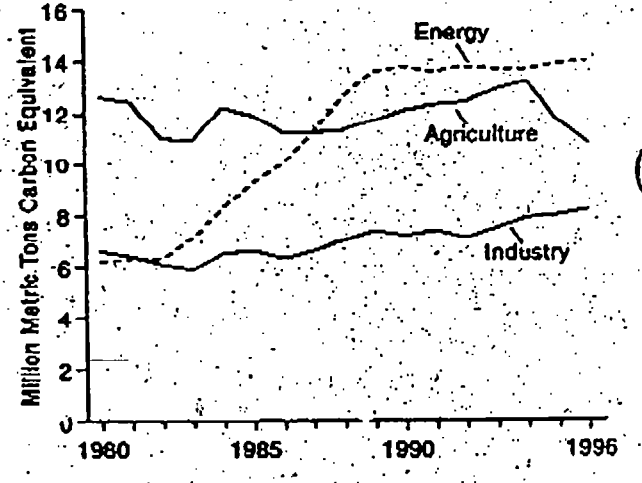

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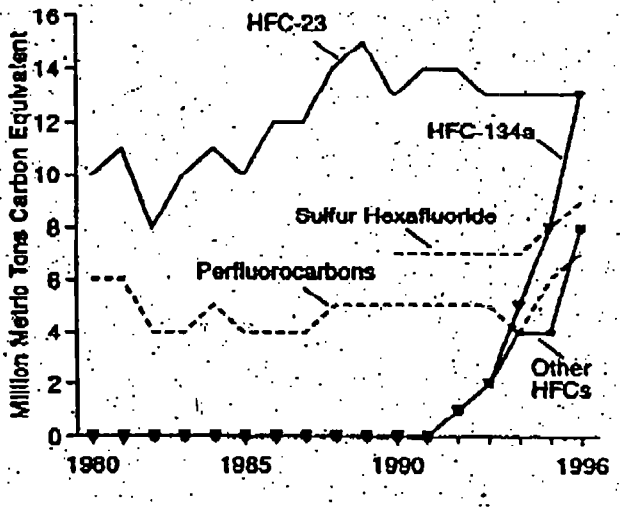
Criteria pollutants (carbon monoxide, nitrogen oxides, and nonmethane volatile organic compounds) are reactive gases that usually decay quickly in the atmosphere. They are not necessarily greenhouse gases themselves, but they can promote atmospheric chemical reactions that create tropospheric ozone, which is a potent greenhouse gas. Because the ozone-creating effect of these gases varies with local atmospheric conditions, it is not possible to compute their effects directly. As precursors to urban "smog," their emissions are regulated under the Clean Air Act. The principal source of emissions of criteria pollutants is the combustion of fossil fuels, particularly in motor vehicles.

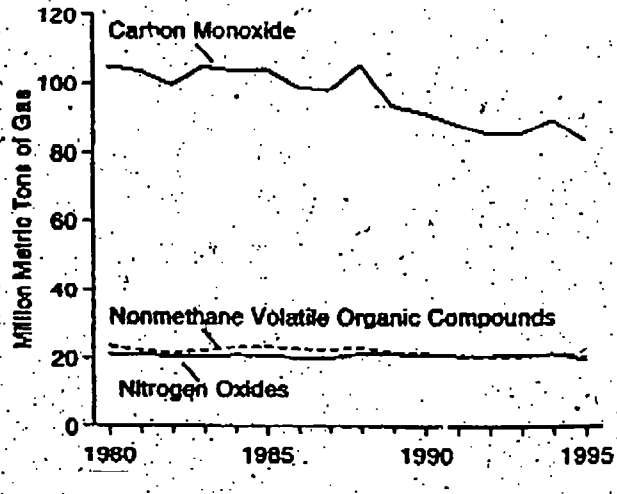
Figure ES6. U.S. Emissions HFCs, PFCs, and Sulfur Hexafluoride, 1980-1996



Source: EIA estimates documented in Chapter 5 of this report.

According to estimates from the U.S. Environmental Protection Agency, national-level emissions of carbon monoxide have been declining since the late 1970s (Figure ES7). Emissions of nonmethane volatile organic

Figure ES7. U.S. Emissions of Selected Criteria Pollutants, 1980-1995



Source: U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *National Air Pollutant Emission Trends, 1900-1995*, EPA-454/96-007 (Research Triangle Park, NC, October 1996), Tables A-1–A-11, pp. A-2–A-16.

compounds and nitrogen oxides have been essentially unchanged in recent years.

Land Use Issues

Changes in land use can also have large, though difficult to quantify, effects on atmospheric concentrations of greenhouse gases. In the United States, the expansion of forest land and the growth of existing forests are responsible for removing large amounts of carbon from the atmosphere. Several studies of carbon sequestration in U.S. forests suggest that in the late 1980s and early 1990s, some 111 to 238 million metric tons of carbon was sequestered annually, equivalent to about 8 to 17 percent of U.S. anthropogenic carbon emissions.[3] However, considerable uncertainty is associated with this estimate—particularly with the amount of carbon sequestered in forest soils.

The IPCC recommends including emissions and sequestration from land use changes in national inventories, and the U.S. "National Communication" for the Framework Convention follows this practice.[4] The EIA, however, has elected not to include carbon sequestration from forestry in its "total" estimate of U.S. emissions, for the following reasons:

- There is insufficient information to determine the extent, if any, of year-to-year changes in anthropogenic sequestration of carbon. Changes in national sequestration rates can be estimated only at 5-year intervals. The current estimate is an annual average for the period 1987-1992; new data will become available in 1998, covering the 1992-1997 period.
- The magnitude of the sequestration estimate is subject to considerable uncertainty on several counts. The largest source of uncertainty is the amount of carbon sequestered annually in forest soils.

[3]R.A. Birdsey and L.S. Heath, "Carbon Changes in U.S. Forests," in L.A. Joyce (ed.), *Productivity of America's Forests and Climate Change* (Fort Collins, CO: USDA Forest Service, General Technical Report RM-GTR-271, 1995).

[4]U.S. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-1993*, EPA-230-R-94-014 (Washington, DC, September 1994), p. ES-7.

United States Department of State
Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs
Washington, D.C. 20520

CC: JY
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JA

FAX MESSAGE

Date: October 14, 1997

TO: Janet Yellin
White House/ CEA
FAX NO: 395-6958

TO: Peter Orzag
White House/NEC
FAX NO: 456-2223

TO: Todd Stern
White House
Asst to President, Staff Secretary
FAX NO: 456-2215

FROM: Melinda Kimble
OES
FAX NO: 647-0217

7 pgs. follow

See Attached.

1) The Japanese proposal is differentiated - e.g. some countries will have flexibility & choices on how they develop a target.

2) The budget period & the target are more reasonable than the EU's - we might focus on how to use this in developing our plan.

→ The letter from the Hill highlights their concerns about the two-step.

United States Senate
COMMITTEE ON FOREIGN RELATIONS
WASHINGTON, DC 20510-6225

October 1, 1997

The Honorable Madeleine K. Albright
U.S. Secretary of State
2201 C. Street, N.W.
Washington, D.C. 20520

Dear Madam Secretary:

It has come to our attention that the European Union (E.U.) has proposed an amendment to the rules of procedure of the United Nations Framework Convention on Climate Change (FCCC), which would permit parties to the FCCC to adopt protocols by a three-quarter majority. If such a voting procedure were in place we fear that parties could approve new commitments at the Third Conference of the Parties without the support of the United States when the conference convenes in Kyoto, Japan in December.

Under the current rules of procedure, consensus is required for the adoption of a protocol to the FCCC. We believe that this procedure provides the United States with the necessary leverage to ensure that an agreement is reached that adequately protects U.S. interests. If adopted, the E.U. proposal would cause an even more dramatic shift in these critical negotiations away from the interests of the United States.

We also raise additional concerns regarding the procedure for Senate ratification of any legal instrument that comes out of Kyoto. As you will recall, the Committee stated in 1992, in Executive Report 102-55 (which accompanied the resolution of ratification for the FCCC) that:

> ... a decision by the executive branch to reinterpret the Convention to apply legally binding targets and timetables for reducing emissions of greenhouse gases to the United States would alter the "shared understanding" of the Convention between the Senate and the executive branch and would therefore require the Senate's advice and consent.

The Senate is on record as having rejected legally-binding targets and timetables as an acceptable provision of the FCCC. We believe that any effort to amend the FCCC in this regard would alter the "shared understanding" of the Senate when it gave its advice and consent to ratification of non-binding targets and timetables in 1992, and would require the Administration to resubmit the entire amended FCCC to the Senate for its advice and consent.

7237-002

Madam Secretary, we seek your assurance that the United States will reject the EU proposal -- as well as any effort to amend the FCCC rather than negotiate a new Protocol -- if the Administration chooses to support legally-binding targets and timetables for reducing emissions of greenhouse gases.

Sincerely,

JESSE HELMS
Chairman
Committee on
Foreign Relations

ROD GRAMS
Chairman
Subcommittee on
International Operations

CHUCK HAGEL
Chairman
Subcommittee on
International Economic Policy

Proposal on QELROs
by the Government of Japan
September 29, 1997

1. As the president-designate of the COP3, the Government of Japan proposes 5% as a base reduction rate for deciding a reduction target for each country on the premise that the following conditions from (1) to (3) are accepted. The base year of this reduction is 1990. The target period for the reduction is five years from 2008 to 2012 (the first budget period).

(1) Green house gasses covered by this proposal include carbon dioxide, methane and nitrous oxide.

(2) As the quantified target includes a portion prescribed by future technological development and changes of energy situation and industrial structure, etc. which are uncertain factors not foreseen at present, compliance clauses in regard to this portion should have certain flexibility. Formulation of this flexibility has to be stipulated in a protocol or another legal instrument. In any case, the emissions of any country shall not exceed its emissions in 1990.

(3) The target for an individual country is differentiated by emission per GDP, emission per capita and population growth:

Countries with the following conditions may apply any one of the following Alternative Reduction Rates:

(a) For a country of which emissions per GDP in 1990 (A) are less than the emission per GDP of all Annex I countries in 1990 (B):

Alternative Reduction Rate (%) = 5% × (A/B)

(b) For a country of which emissions per capita in 1990 (C) are less than the emission per capita of all Annex I countries in 1990 (D):

Alternative Reduction Rate (%)= 5% × (C/D)

(c) For a country of which population growth from 1990 to 1995 exceeds the population growth of all Annex I countries for the same period, the higher growth of population should be considered in deciding the target of the country. Concrete formulation of this alternative reduction rate is to be developed.

2. Banking, borrowing, emissions trading and joint implementation should be adopted under certain conditions.

3. Emissions for the second budget period shall not exceed those for the first budget period. More sophisticated method of differentiation should be applied for the second budget period.

Withdrawal/Redaction Marker
Clinton Library

DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
001. letter	To President Clinton from Japanese PM Hashimoto (4 pages)	09/27/1997	P1/b(1)

COLLECTION:
Clinton Presidential Records
Council of Economic Advisers
(Subject Files)
OA/Box Number: 24254

FOLDER TITLE:
Climate Change #4 [2]

2017-1095-F
bg244

RESTRICTION CODES

Presidential Records Act - [44 U.S.C. 2204(a)]

P1 National Security Classified Information [(a)(1) of the PRA]
P2 Relating to the appointment to Federal office [(a)(2) of the PRA]
P3 Release would violate a Federal statute [(a)(3) of the PRA]
P4 Release would disclose trade secrets or confidential commercial or financial information [(a)(4) of the PRA]
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b(7) Release would disclose information compiled for law enforcement purposes [(b)(7) of the FOIA]
b(8) Release would disclose information concerning the regulation of financial institutions [(b)(8) of the FOIA]
b(9) Release would disclose geological or geophysical information concerning wells [(b)(9) of the FOIA]

OFFICE OF TIMOTHY E. WIRTH
UNDER SECRETARY
FOR GLOBAL AFFAIRS

DEPARTMENT OF STATE
2201 C Street, N.W.
Room 7250
Washington, D.C. 20520
Phone: 202-647-6240 Fax: 202-647-0753

JL4
JAF
BB
AM
RL
JA

TO: Sperling Climate Working Group Members (See Addressees Listed)

FROM: Timothy E. Wirth

DATE: October 7, 1997

FAX:

Number of Pages (including cover): 5

COMMENTS: Reporting Memo from Under Secretary Wirth on the two day climate meeting in Honolulu on October 3&4.

Withdrawal/Redaction Marker
Clinton Library

DOCUMENT NO. AND TYPE	SUBJECT/TITLE	DATE	RESTRICTION
002. memo	To Sperling Climate Working Group from Timothy E. Wirth, re: Some Possible Momentum (4 pages)	10/07/1997	P1/b(1)

COLLECTION:
Clinton Presidential Records
Council of Economic Advisers
(Subject Files)
OA/Box Number: 24254

FOLDER TITLE:
Climate Change #4 [2]

2017-1095-F
bg244

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