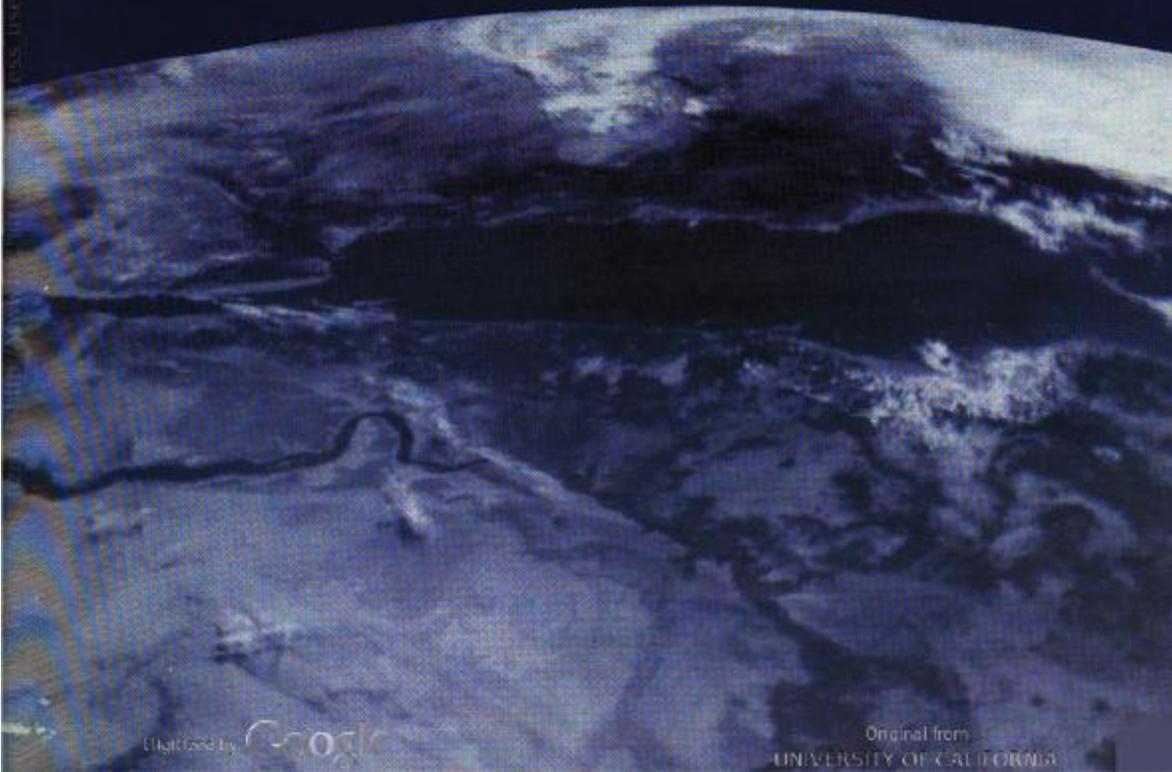


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THE CLIMATE CHANGE ACTION PLAN

President William J. Clinton
Vice President Albert Gore, Jr.

October 1993



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PREFACE

Last year in Rio de Janeiro, Brazil, world leaders and citizens from more than 200 countries came together to confront the global ecological crisis. The Earth Summit aroused the hopes and dreams of people around the world and set in motion ambitious plans to address the planet's deepest environmental threats. We shared a common mission: to provide a higher quality of life for ourselves and a brighter future for our children.

At the Earth Summit, the United States joined other countries in signing the Framework Convention on Climate Change, an international agreement to address the danger of global climate change. The Convention has been signed by 161 countries and has been ratified by 31 of those countries. The objective of the Convention was stated to:

"...achieve ... stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner."

The international community rallied around the threat of climate change because scientists agree that the risk is real. There is no doubt that human activities are increasing the atmospheric concentrations of greenhouse gases, especially carbon dioxide, methane, and nitrous oxide. All theoretical models predict that these increases in greenhouse gas concentrations will cause changes in climate both regionally and globally -- with adverse consequences likely for human health, as well as to ecological and socio-economic systems. The best current predictions suggest that the rate of climate change will far exceed any natural climate changes that have occurred during the last 10,000 years. Of course, there are uncertainties regarding the precise magnitude, timing and regional patterns of climate change. But any human-induced climate change that does occur will not be easily reversed for many decades or even centuries because of the long atmospheric lifetimes of the greenhouse gases and the inertia of the climate system.

Our capacity to act in the face of long-term threats is illustrated in a story about a French general who asked his gardener to plant a tree. "Oh, this tree grows slowly," the gardener said. "It won't mature for a hundred years." "Then there's no time to lose," the general answered. "Plant it this afternoon."

Global climate change is a long term problem that will require years of sustained effort. The time for action is now.

EXECUTIVE SUMMARY

We must take the lead in addressing the challenge of global warming that could make our planet and its climate less hospitable and more hostile to human life. Today, I reaffirm my personal, and announce our nation's commitment to reducing our emissions of greenhouse gases to their 1990 levels by the year 2000. I am instructing my administration to produce a cost-effective plan . . . that can continue the trend of reduced emissions. This must be a clarion call, not for more bureaucracy or regulation or unnecessary costs, but instead for American ingenuity and creativity, to produce the best and most energy-efficient technology.

*President Clinton
April 21, 1993*

President Clinton's Climate Change Action Plan meets the twin challenges of responding to the threat of global warming and strengthening the economy. Returning U.S. greenhouse gas emissions to their 1990 levels by the year 2000 is an ambitious but achievable goal that can be attained while enhancing prospects for economic growth and job creation, and positioning our country to compete and win in the global market.

There is no doubt that human activity is increasing the concentration of greenhouse gases in the atmosphere. The buildup of greenhouse gases threatens to change the global climate system, raise sea levels and inundate coastal areas, inflict irreversible damage to ecosystems, and destabilize agricultural production. But the magnitude of the threat should galvanize, not paralyze, our response.

Responding to future threats with immediate action takes vision and discipline. The international community has agreed that action is necessary now, even while the impacts of climate change may take decades to fully unfold. The Framework Convention on Climate Change challenges the industrial countries of the world to begin a long journey with the proverbial first step -- to return greenhouse gases to 1990 levels by the year 2000. We should strive to do no less; ultimately we will have to do more.

A full scale international response is needed to confront the climate change threat, and the United States will help to lead that effort. The President challenges the American people and other countries to meet the ambitious goals of the Framework Convention on Climate Change.

The President's Climate Change Action Plan presented here:

- Returns U.S. greenhouse gas emissions to 1990 levels by the year 2000 with cost effective domestic actions;
- Includes nearly 50 new and expanded initiatives
- Includes measures to reduce all significant greenhouse gases - carbon dioxide, methane, nitrous oxide, hydroflouorocarbons, and other gases;

- Takes measures in all sectors of the economy that emit greenhouse gases — from energy production and use to forestry initiatives;
- Fosters partnerships with business where focused government guidance and flexible approaches can produce cost-effective emission reductions;
- Stimulates investments in the technologies of the future, strengthening the American position in the global environmental technology marketplace;
- Is backed up with real federal resources — the Administration will commit \$1.9 billion in new and redirected funding between 1994 and 2000 to the Action Plan;
- Reduces the deficit through two new policies. One would allow commuters the option of "cashing-out" employer-paid parking, by taking the value of the fringe benefit as taxable income. The second would permit private development at existing Federal hydroelectric facilities in exchange for lease payments. These reforms would raise \$2.7 billion between 1994 and 2000;
- Leverages over \$60 billion in private investment between 1994 and 2000 in environmental technologies. These investments pay off for U.S. businesses and citizens — the investments lead to over \$60 billion in reduced energy costs between 1994 and 2000, with continued benefits of over \$200 billion in energy savings between 2001 and 2010;
- Creates new jobs in the sectors and industries that produce, market, or install technologies that save energy or reduce greenhouse gas emissions;
- Includes a pilot program of joint implementation to gain experience in evaluating investments in other countries for emission reduction benefits;
- Coordinates multiple programs to enhance their effectiveness and to strengthen their relationship with electric and gas utilities, state and local governments, and industry;
- Is designed for rapid and aggressive implementation and minimizes actions likely to be delayed through legislative or regulatory processes;
- Will be actively monitored to review progress toward meeting the President's goal, and will institute new programs as needed to ensure that emission reductions are made; and
- Establishes a White House team to develop strategies for long term emission reductions, including emissions from automobiles and trucks.

OVERVIEW

America's most important assets are its people — decent, hard-working, creative and concerned. When that talent is focused through our economic and political system to solve a problem, it can accomplish great things. We have put people on the moon, we have won the cold war, and we have provided unparalleled prosperity. We can now begin to do the same for the global environment.

This plan harnesses economic forces to meet the challenges posed by the threat of global warming. It calls for limited, and focused, government action and innovative public/private partnerships. It relies on the ingenuity, creativity, and sense of responsibility of the American people.

President Clinton's Action Plan responds to the threat of global climate change and helps guide the U.S. economy toward environmentally sound economic growth into the twenty-first century. The plan is *comprehensive*, targeting all greenhouse gases and all sectors of the economy. The plan inaugurates a new era of *partnership* with American business to help solve environmental problems. The plan is designed for *rapid implementation* that can quickly deliver *cost-effective* results. The plan was developed by an interagency team that relied greatly on public input, and is a *coordinated* federal response, involving many agencies working together. The plan will be actively monitored for effectiveness and will adapt to *changing circumstances*. Finally, the plan lays the foundation for an *international response* to this global challenge.

COMPREHENSIVENESS

Emissions of greenhouse gases are pervasive in the U.S. economy. A policy that relies on dramatic reductions of greenhouse gas emissions from one sector of the economy or one region of the country is unlikely to be effective or economic: there is no "magic bullet" that solves the problem. However, opportunities to reduce greenhouse gas emissions in cost-effective ways are distributed broadly throughout the economy. Therefore, the Climate Change Action Plan consists of almost 50 actions involving all sectors — industry, transportation, homes, office buildings, forestry, and agriculture. These actions are targeted in specific sectors to stimulate markets for technologies that reduce emissions of carbon dioxide (CO₂), methane, nitrous oxide, and halogenated compounds that contribute to global warming. The plan also reduces emissions of CO₂ by protecting forests, which are greenhouse gas "sinks" that store carbon removed from the atmosphere.

ESTABLISHING PARTNERSHIPS FOR PROGRESS

The Climate Change Action Plan will continue to break new ground in the relationship between government and the private sector — fostering cooperative approaches and a forward looking agenda, rather than relying exclusively on command-and-control mandates that tend to lock technologies into place and stifle innovation. These partnerships reflect the mutual responsibility of both the private sector and the government to improve environmental performance while enhancing economic growth and job creation. In several key areas — electric utilities, motor manufacturers and users, automobile

manufacturers, chemical and aluminum manufacturers — American firms are entering into partnerships with the Federal government to attain environmental objectives using flexible and cost-effective options.

Today, President Clinton is announcing the **Climate Challenge**, a partnership between the Department of Energy and major electric utilities who have pledged to their reduce greenhouse gas emissions. Under the partnership, utilities have the opportunity to choose from a wide range of control options and to experiment with innovative ideas to achieve their emission reduction goals. The same partnership approach motivates the joint DOE/EPA **Climate Wise** program - firms who respond to the challenge of reducing greenhouse gas emissions will set bottom-line emission targets that they can attain using the most cost-effective means available. In another initiative announced today, the DOE **Motor Challenge**, motor system manufacturers, industrial motor users, and utilities will begin an aggressive program to install the most energy-efficient motor systems in industrial applications. Chemical companies have formed a working partnership with EPA to reduce by-product emissions of potent greenhouse gases by 50 percent from their manufacturing operations. Aluminum producers are joining with EPA to identify greenhouse gas emission reduction opportunities, and to set targets for real reductions. These new commitments — and the partnerships established between the private sector and the Federal government — provide a strong foundation for the other initiatives outlined in the Action Plan, ensuring that the programs will deliver real results.

DESIGN FOR RAPID IMPLEMENTATION

While the Action Plan contains major new initiatives, many of the actions build on the success of earlier public and private programs that have focused attention on energy savings or other emission reduction opportunities. These programs do not rely on exotic new technologies, but can help accelerate the diffusion of existing technologies into the marketplace. Much of the program outlined here can be implemented rapidly and without new legislative authority. Expanding, adapting, or reinforcing innovative and successful programs will ensure that emission reductions can begin quickly enough to meet the President's goal to return greenhouse gas emissions to 1990 levels by the year 2000.

Programs that already demonstrate success on limited budgets will be expanded, largely by redirecting resources to those programs that deliver real results. Additional funding will allow successful programs to cover larger market segments or to expand into new sectors or technologies. The best programs in one agency will be adapted by other agencies and programs will be reinforced by complementary initiatives.

COST-EFFECTIVENESS

Low cost and even profitable opportunities exist to reduce emissions of greenhouse gases. While markets work well in most circumstances, significant transaction costs, information gaps, regulatory barriers and other market imperfections exist that can raise greenhouse gas emissions. Reducing these market imperfections will save money for many U.S. consumers and firms as they reduce greenhouse gases. The Action Plan targets these opportunities through public/private partnerships, allowing the private sector maximum flexibility to devise innovative programs to reduce emissions. And by taking a comprehensive

approach encompassing all major greenhouse gases, both sources and sinks, and all sectors of the economy, the Action Plan offers the widest scope for creative and cost-effective actions.

PUBLIC INPUT

The President directed his Administration to tap the ingenuity and creativity of the American people. Part of that effort involved identifying innovative programs in all levels of government and in the private sector to explore their potential for reducing emissions. The White House Conference on Global Climate Change, held on June 10-11 in Washington, DC, provided the opportunity for hundreds of recognized experts in the private sector, the environmental community, academics, and others to offer their suggestions and views directly to the Administration officials responsible for developing the plan and analyzing its implications. Additional workshops were held during the following months, and participants continued to offer new and innovative ideas. This plan is based on the best ideas that Americans have offered.

The Action Plan was developed in an interagency process that involved the White House and key agencies, including the Environmental Protection Agency and the Departments of Agriculture, Commerce, Energy, Interior, State, Transportation, and Treasury. In addition, a team of analysts from these agencies was assigned the task of quantifying the impact of various proposals on greenhouse gas emissions and the economy.

COORDINATED FEDERAL ACTIVITY

The President directed his Administration to work together for the benefit of the American people and for the environment. Too often, federal programs are a confusing and contradictory patchwork quilt that lack coordination and are poorly linked with state and local level efforts or private initiatives. This plan was developed with an unprecedented degree of cooperation at all levels in the Administration, from Cabinet Secretaries and Administrators to program managers and staff in the agencies. Implementation will require a similar degree of interagency coordination to deliver results. The National Performance Review has highlighted areas where effective coordination can deliver better performance and cost less in every area of government action. The development and implementation of this plan will apply the same lessons to the climate change problem.

ADAPTING TO CHANGING CIRCUMSTANCES

The Action Plan is expected to reach the emission reduction goal under reasonable assumptions concerning economic growth and other trends. However, a substantial degree of uncertainty accompanies any attempt to project future emission levels. The analysis supporting the plan represents a best estimate under the most likely scenario, but we recognize that these estimates could vary by a significant degree under other plausible assumptions.

The economy continually evolves in ways we cannot predict perfectly; businesses and citizens must adapt to changing circumstances. Successful policy must do the same, and this plan will evolve as circumstances warrant. A White House task force will actively monitor trends in greenhouse gas emissions and the implementation of the Action Plan, and if necessary will modify the program to keep

the emission reductions on track. The first opportunity to evaluate the Action Plan is likely to come within one year. The Framework Convention on Climate Change will enter into force when 50 countries ratify the agreement, and this could occur in early 1994. Within six months of entry into force, the U.S. will submit a National Action Plan to the Conference of the Parties of the Convention. This Climate Change Action Plan, or an updated version if necessary, will form the cornerstone of the U.S. National Action Plan required by the Climate Convention. After that milestone is reached, the White House task force will reassess and update the Action Plan every two years, or sooner if called upon by the Conference of the Parties.

The Administration will also begin to identify additional opportunities for long term emission reductions. The Action Plan focuses on near-term emission reduction opportunities in order to attain a near-term goal. Perhaps more importantly, the Plan sets in motion an ongoing process of policy development to address the long term global threat.

ENCOURAGING INTERNATIONAL EMISSION REDUCTIONS

While the plan achieves the President's goal with domestic actions alone, the Administration recognizes the significant potential for cost-effective emission reductions in other countries. The Framework Convention on Climate Change allows countries to explore emission reduction projects together under a program of "joint implementation." In order to gain experience in verifying net emission reductions from certain types of investments in other countries, the Administration is announcing the U.S. Initiative on Joint Implementation. Projects developed under the initiative can provide greenhouse gas emission reductions beyond the domestic programs in the President's plan and promote sustainable development. This initiative will also help advance thinking on the many issues that need resolution before an international joint implementation effort can be fully mounted. By leading the international community in developing the appropriate guidelines and criteria necessary to ensure maximum global environmental and economic benefits, the United States will help lead the international response to the climate change threat.

THE CLIMATE CHANGE ACTION PLAN

The major greenhouse gases are carbon dioxide (CO₂), methane, nitrous oxides, and hydroflourocarbons (HFCs). As shown by Figure 1, net emissions of these gases in the U.S. are projected to grow by about 7 percent between 1990 and 2000 without the Action Plan, from 1,462 million metric tons of carbon equivalent (MMTCE) to 1,568 MMTCE.¹

Carbon dioxide from fossil energy production and use is the largest contributor to greenhouse gas emissions. In 1990, U.S. CO₂ emissions were 1,367 MMTCE. In 1990, forests and other plants removed 130 MMTCE from the atmosphere, leaving net U.S. carbon emissions at 1,237 MMTCE in 1990. Emissions of methane, primarily from landfills, coal mining, natural gas production, and agricultural activities, were 166 MMTCE in 1990, or less than 12% of U.S. net greenhouse gases. Nitrous oxide (N₂O) emissions (39 MMTCE) and HFCs (20 MMTCE) contributed another 2.7% and 1.4% respectively of greenhouse gases in 1990².

Net carbon emissions alone are projected to grow to 1,337 by the year 2000 — over 8 percent above 1990 levels - without the policies in outlined in the Action Plan³. Methane and nitrous oxide emissions are expected to decline slightly, but HFCs are expected to increase to 45 MMTCE. These projections already account for some policies recently enacted and programs implemented by the Administration that reduce CO₂, methane, and nitrous oxide emissions. Without these programs, U.S. greenhouse gas emissions would rise to 1,674 MMTCE by 2000, according to Administration estimates. Thus, while significant progress has been made, more is needed to meet the President's goal. In order to return U.S. greenhouse gas emission to 1990 levels by the year 2000, the Action Plan must reduce the projected emission level by about 106 million metric tons below the year 2000 forecasted level.

The next section describes the aggregate impact of the Action Plan on emission levels, the Federal budget, and the economy. The remainder of the document highlights the key actions that reduce greenhouse gas emissions. A comprehensive description of all initiatives included in the Action Plan is contained in a series of one-page descriptions found at the end of the document.

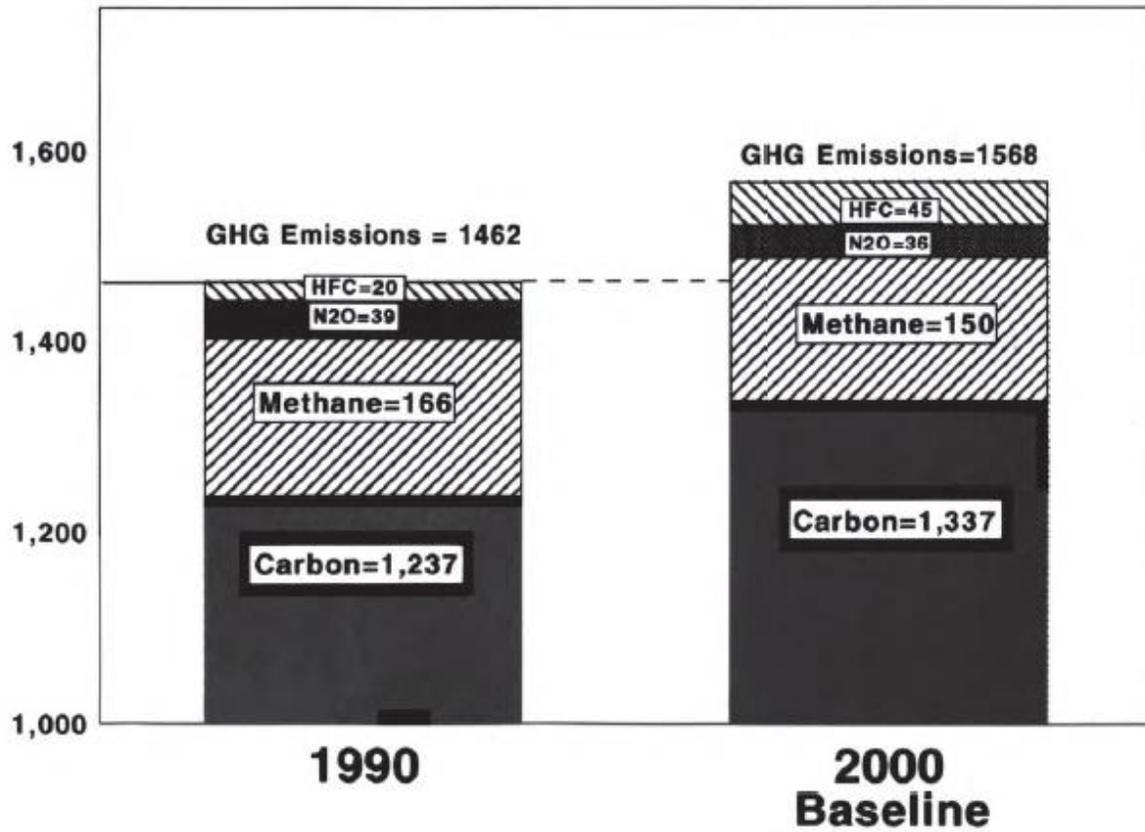
¹ All gases are converted to MMTCE by conversion factors based on radiative forcing, called "global warming potential." The emission estimates for 1990 are taken from Emissions of Greenhouse Gases in the United States, 1985-1990 (EIA, 1993) and Anthropogenic Methane Emissions in the United States. Estimates for 1990 (EPA, 1993). The nitrous oxide emissions from agriculture were provided by USDA. Projections are based on analysis conducted by DOE, EPA, and USDA for the Climate Change Action Plan. Baseline estimates of emissions may change as internationally recognized methodologies evolve.

² The HFC figure includes a small amount of other halogenated compounds, discussed later.

³ Although projections of greenhouse gases are given as point estimates, considerable uncertainty surrounds any projection that depends on future economic activities. A broad range of outcomes are plausible. See the Appendix I for a discussion of uncertainty.

Figure 1 Greenhouse Gas Emissions

Carbon-Equivalent in Million Metric Tons



Note : Carbon reported as sources less sinks. Forest sinks are 130 MMT in 1990 and 137 MMT in 2000.

EMISSION REDUCTIONS, BUDGET IMPACTS, AND ECONOMIC EFFECTS

The Action Plan targets multiple emission reduction opportunities in all major areas: energy demand in the residential, commercial, industrial and transportation sectors, energy supply, methane and other gases, and forestry. A broad portfolio of policy actions is more likely to succeed than a narrow one. Some programs called for here will work better than expected, while others may fall short of their estimated impact, but a portfolio approach reduces the risk that any specific program that does not live up to expectations will cause a substantial shortfall of emission reductions. Table 1 shows the impact of the Action Plan on emissions, the Federal budget, and the economy.

Emission Reductions

As shown on Figure 2, the Action Plan will return net U.S. greenhouse gas emissions to 1990 levels by the year 2000. The combined impact of all actions reduces emissions from projected levels by 108 MMTCE. Net carbon emissions are likely to be slightly higher – about 2 percent above their 1990 levels. The rate of increase in HFC emissions is cut in half. Offsetting these gains in emissions are further reductions in methane and nitrous oxide emissions.

Federal Budget Impact

Between 1994 and 2000, the Administration will spend roughly \$1.9 billion on the actions outlined in this plan, largely through redirecting federal funds. However, two elements in the plan increase net revenues over the same period and thus contribute to deficit reduction. A reform in the tax treatment of employer-paid parking will bring in \$2.2 billion over the period from commuters who choose to take the cash value of this fringe benefit. In addition, giving private developers an opportunity to invest in efficiency upgrades at federal hydroelectric facilities and market the incremental generation will bring in \$500 million in lease payments. As a package, this Action Plan helps reduce the Federal budget deficit.

Economic Impact

Many of the programs outlined here will encourage individuals and firms to invest in energy saving equipment or other technologies that yield significant cost savings over the long term. Comparing the magnitude of these investments with the value of energy savings indicates the overall cost-effectiveness of the Action Plan. While investing over \$60 billion in greenhouse gas emission reductions between 1994 and 2000, individuals and firms realize over \$60 billion in energy savings between 1994 and 2000, and realize continued returns in the form of an additional \$207 billion in energy savings between 2001 and 2010⁴. By stimulating investments in cost-effective opportunities for greenhouse gas emission reductions, the Action Plan can increase the long-term profits for American business and help consumers save money.

⁴ Figures on the table are given in constant (real) 1991 dollars, but are not discounted. Discounting future savings will tend to lower the apparent cost-effectiveness of many of the options, but the effect of that adjustment will depend on the discount rate used and the time profile of investment and cost savings. It is not possible to determine how much of this expenditure represents new investment and how much represents a shift in the composition of investment from a macroeconomic perspective.

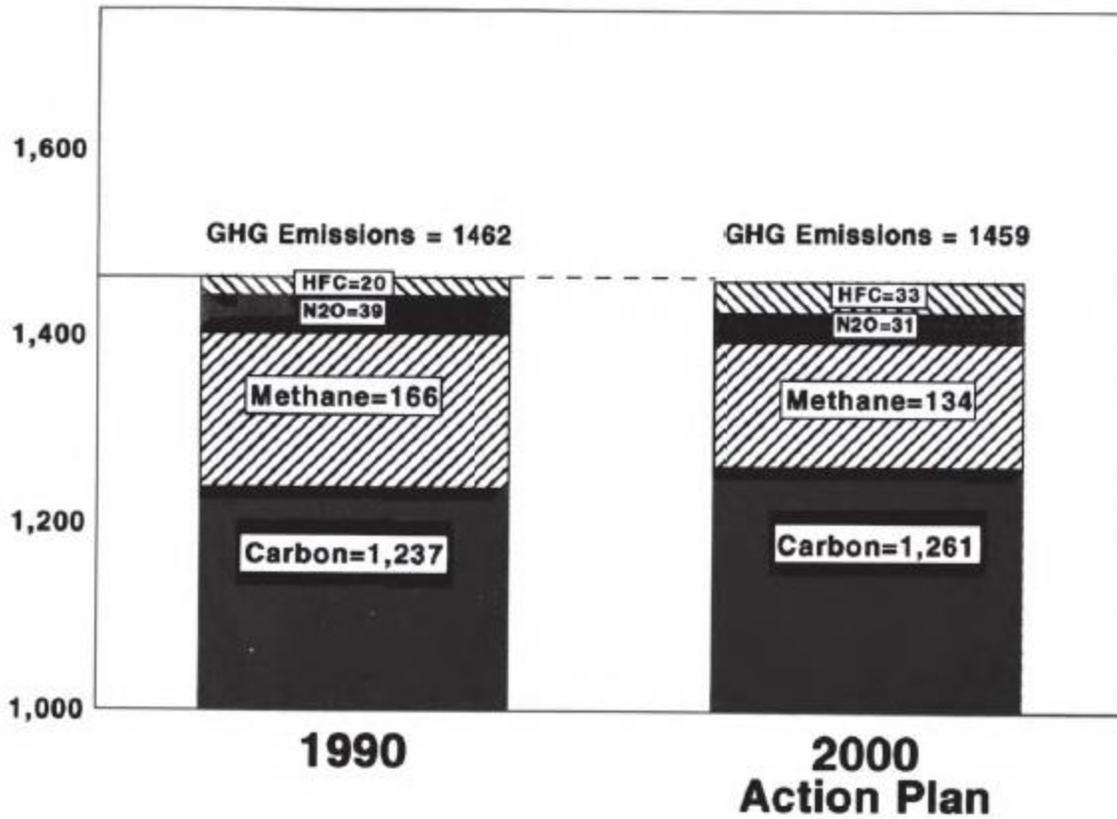
Summary of Greenhouse Gas Emission Reductions and Economic Impacts

Sector	Greenhouse Gas Reduction (MMTCE) <u>2000</u>	Federal Outlay (millions) <u>1994-2000</u>	Private Capital Investment (millions) <u>2000</u>	Cumulative Value of Energy Savings (millions)	
				<u>1990-2000</u>	<u>2001-2010</u>
Energy Demand					
- <i>Commercial</i>	10.6	\$445	\$20,500	\$8,600	\$36,700
- <i>Residential</i>	16.3	\$397	\$31,200	\$14,800	\$62,300
- <i>Industrial</i>	19.0	\$247	\$4,900	\$14,200	\$65,900
- <i>Transportation</i>	8.1	-\$2132	\$2,200	\$18,600	\$31,200
Energy Supply	10.8	\$57	\$1,200	\$4,400	\$9,000
Methane Reduction and Recovery	16.3	\$93	\$860	\$650	\$2,000
HFC, PFC and Nitrous Oxides Reductions	16.3	\$26	N/A	N/A	N/A
Forestry Actions	10.0	\$75	\$40	N/A	N/A
TOTAL	108.6	-\$793	\$60,900	\$61,250	\$207,100

Note: Dollar figures for private investment and the value of energy savings are in undiscounted 1991\$. Federal outlay is in current year dollars.

Figure 2 Greenhouse Gas Emissions

Carbon-Equivalent in Million Metric Tons



Note : Carbon reported as sources less sinks. Forest sinks are 130 MMT in 1990 and 147 MMT in 2000.

ENERGY DEMAND ACTIONS

In 1990, the United States consumed nearly 85 quadrillion Btus of energy, which produced 1,367 million metric tons (MMTs) of carbon⁵. Fossil energy consumption is responsible for more than 85 percent of U.S. greenhouse gas emissions.

Investing in energy efficiency is the single most cost-effective way to reduce CO₂ emissions. The Action Plan combines an array of public/private partnerships to stimulate the deployment of existing energy-efficient technologies and accelerate the introduction of more advanced technologies. These programs will cut CO₂ emissions while enhancing productivity at home and our competitiveness abroad. It is an aggressive agenda, and it is backed up with the resources necessary to get the job done.

Technical studies have consistently shown that profitable energy efficiency investments exist in residential, commercial, and industrial sectors, yet many of these opportunities go unrealized. This observation neither refutes the technical studies nor suggests that people or firms behave irrationally — energy analysts have identified the information, regulatory, financial and institutional barriers that impede this investment. Many private sector efforts successfully address these barriers. For example, utility sponsored conservation programs and energy service companies are able to exploit opportunities for profitable energy savings.

Programs that enhance and accelerate these trends can help reduce greenhouse gas emissions and increase U.S. competitiveness. The Action Plan is a comprehensive strategy that applies innovative solutions to these investment barriers — from financial reforms in residential mortgages to agreements between motor manufactures and users. This plan will align market forces with the environmental imperative to reduce greenhouse gas emissions.

In the past, many Federal programs have been a confusing patchwork of competing activities that were not coordinated effectively with utility or state and local efforts. By expanding existing successful programs, combining them with new and complementary initiatives, and linking programs with state, local, and private sector efforts, the Action Plan will maximize the energy-saving impact of Federal programs.

⁵ A quadrillion Btu (quad) is 10¹⁵ Btu.

CASE STUDY

ELI LILLY & COMPANY TO SAVE \$3 MILLION EACH YEAR WITH GREEN LIGHTS

Green Lights encouraged us to seek additional opportunities to prevent pollution that also give a good return on our investment. EPA's 'work-together' approach and its recognition that industry needs a reasonable return on capital makes the Green Lights program ideal for us — the partnership approach and ability to custom-tailor implementation plans result in far greater savings than the most ambitious regulations.

Randall L. Tobias
Chairman and CEO
Eli Lilly and Company

Eli Lilly and Company of Indianapolis was one of the original partners in the EPA Green Lights program. Lilly already had an aggressive corporate energy-saving program when they joined the program. After joining Green Lights, Lilly found that many of the company's specifications and guidelines did not incorporate the latest lighting technology - and that many outside firms attempting to design cost-effective solutions often ignored the long-term savings potential of efficient lighting. According to the company, Green Lights helped identify better alternatives and achieve maximum savings from energy-efficient lighting. As a result of its partnership with EPA, Lilly expects its annual savings to rise to \$3 million, three times more than originally anticipated.

After saving \$23,500 in annual lighting costs from a \$33,800 energy-efficient lighting project in a building that was already under construction, Lilly reviewed other construction projects for similar revisions. Lilly then extended its lighting upgrade work to existing facilities and now has more than 1 million square feet of Green Lights projects either completed or underway. Almost twice that amount is scheduled for upgrades in 1994.

Lilly is currently working with EPA on its new Energy Star Buildings program — designed to promote energy-efficient heating, cooling and air handling. Lilly has found that, by minimizing the production of waste heat from lighting, efficient lighting systems allow air conditioning and ventilation systems to be operated more efficiently and economically. Lilly and EPA are currently using one of the firm's buildings as a demonstration site for energy-efficient air handling systems.

Commercial Energy Efficiency Strategy

In 1990, commercial buildings accounted for nearly 11 percent of total end-use energy consumption⁶. However, commercial buildings consumed over 30 percent of all electricity, primarily for lighting, heating, cooling, and air handling. Including the fossil fuel used to generate the electricity, the commercial sector accounts for over 15 percent of U.S. CO₂ emissions⁷.

Across America, companies are investing in energy efficiency in order to improve their energy performance, lower overhead, and increase their competitiveness. The EPA Green Lights program continues to help firms reduce lighting bills by forging agreements with corporate partners, utilities, lighting equipment suppliers and by offering state-of-the-art technical assistance. DOE and EPA sponsor research programs in commercial energy technologies. Expanding these programs into new technologies and markets will further cut greenhouse gas emissions while improving competitiveness.

PRESIDENT CLINTON IS DIRECTING:

- EPA and DOE to launch new coordinated initiatives, *Energy Star Buildings and Rebuild America*, for efficient heating, cooling, and air handling.
 - These programs will bring the most up-to-date technical knowledge to the people who need it, through coordinated marketing and technical support.
 - EPA and DOE will complete the design phase of the programs and establish pilot partnership efforts by the end of 1994, and will expand the program nationwide in 1995.
- EPA to redouble *Green Lights* efforts to reach untapped portions of the commercial lighting market. Since its inception in 1991, the Green Lights program has entered into more than 1,000 partnership agreements to analyze and, where profitable, to upgrade lighting equipment with more energy-efficient systems.
 - The expanded Green Lights will include new partnerships with electric utilities, a new marketing effort targeted to attract non-profit partners, and expanded technical support for program participants.
- DOE to create a *State Buildings Energy Incentive Fund* that includes state revolving funds for public buildings. The Administration will provide seed money of \$10 million per year over five years to States to fund design and start-up of energy management programs for public buildings.

⁶ All 1990 energy figures are derived from Annual Energy Outlook 1993 (Energy Information Administration). "End-use" energy does not include the generation and distribution losses in electric generation, which on average account for almost 70 percent of the fuel input used in powerplants.

⁷ The emission figure assumes that the sector's electric utility CO₂ emissions are proportional to its share of electric demand.

- DOE to initiate *cost-shared demonstrations* of emerging technologies in Federal, State or local government as well as private buildings. This action will help overcome the lack of confidence in new technologies, a major barrier to their acceptance.

Residential Energy Efficiency Strategy

In 1990, America's homes consumed 15 percent of all U.S. end-use energy, and accounted for 34 percent of U.S. electricity demand. Including the fossil fuels used to generate electricity for homes, the residential sector contributed 19 percent of U.S. CO₂ emissions in 1990. Key targets for improvement include heating and cooling, home appliances, lighting, and the design of the building exterior itself. An energy-efficient new home that meets today's best design criteria consumes 50 percent less energy than a poorly designed alternative, while offering a lower lifecycle cost. A typical home built 15 years ago can be upgraded to save 20 percent of energy use, at a profit to homeowners.

The Action Plan targets key opportunities in the residential sector, and includes a mix of partnerships with business and utilities, economic incentives, and new standards and building codes. The plan will also count on homeowners to embrace the many money-saving options available, as local governments and utilities reach out to assist in this effort.

PRESIDENT CLINTON IS DIRECTING:

- EPA and DOE to form new "*Golden Carrot*" partnerships with non-profits, utilities and environmental groups to accelerate the commercialization of advanced energy efficient appliances. The Golden Carrot describes a combined financial incentive for the development of more efficient appliances. For example, some utilities offer rebates to customers who purchase efficient appliances because the efficiency investment "on the consumer side of the meter" (i.e., the rebate) can help the utility avoid building an expensive new powerplant. Under a Golden Carrot, several utilities pool their rebates to provide a clear market signal (a guaranteed pool of rebate money) for appliance manufacturers to commercialize advanced energy efficient appliances.
- DOE to issue new *residential appliance standards* for eleven product categories: central air conditioners, furnaces, refrigerators, room air conditioners, water heaters, direct heating equipment, mobile home furnaces, kitchen ranges and ovens, pool heaters, televisions and fluorescent lamp ballasts. Cost-effective energy standards ensure that consumers find appliances that are both energy efficient and affordable.

CASE STUDY

DESIGNING TOMORROW'S KITCHEN TODAY The Golden Carrot Super Efficient Refrigerator Program

The SERF program allowed us to accelerate the development process and bring environmentally superior products to the market sooner. . which will have all the latest technological advances of a super-efficient product and all of the quality, style, and convenience consumers expect from a Whirlpool appliance.

*Jeff Fettig, Vice President of Group Marketing and Sales,
Whirlpool North American Appliance Group*

In a "Golden Carrot" program, utilities offer financial incentives to manufacturers to make major advances in energy efficiency and product performance. The method: pooled utility rebates, which together have more impact on the market than individual, uncoordinated rebates that are unlikely to affect product development. In the first Golden Carrot, 24 utilities pooled \$30 million in the Super Efficient Refrigerator Program (SERF). SERP then held a contest - the manufacturer who could build the most efficient CFC-free refrigerator at the lowest cost would get guaranteed rebates from the pool to offset the incremental product cost. Consumers get a more affordable and environmentally sound refrigerator. Earlier this year SERP announced that the winner, Whirlpool Corporation, will deliver energy-efficient refrigerators beginning in 1994. The runner-up, Frigidaire, also announced it would soon introduce super-efficient models.

The idea was conceived in 1990 during discussions between Pacific Gas & Electric (PG&E), the nation's largest investor-owned utility, and the Natural Resources Defense Council (NRDC) on how utilities could get the maximum social benefits from their conservation programs. Later that year, EPA hosted a meeting with PG&E, NRDC, the American Council for an Energy-Efficient Economy (ACEEE), and the Washington State Energy Office to organize the first Golden Carrot. The program required an unprecedented effort to recruit a large number of utilities to pool tens of millions of dollars. EPA played a leadership role, primarily by:

- Engaging manufacturers to research CFC-free technologies.
- Drafting, circulating, and marketing SERP proposals to prospective utilities.
- Educating utility regulators on the social benefits of utility investment in SERP.
- Assisting SERP in obtaining Department of Justice assurance on compliance with antitrust laws.

As utility participation approached a critical mass, they were increasingly willing and able to design, market, and implement the program. EPA ultimately stepped back and the private sector - utilities and manufacturers - did the job. With very modest taxpayer money, EPA and its partners leveraged a much larger private sector investment in energy efficiency and pollution prevention. The approach is an important model for Federal leadership in promoting advanced technologies.

- DOE to work with Department of Housing and Urban Development, Veterans Administration, and other agencies to lead a new national effort to market *Home Energy Rating Systems (HERS) and Energy-Efficient Mortgages (EEMS)*. These programs allow home buyers to finance investments in energy improvements through their mortgage lender when the monthly energy savings are greater than increased mortgage payments. Current federal and state programs are fragmented and not readily accessible to lenders or borrowers and their use is not widespread. Federal agencies will coordinate an effort involving financial institutions, utilities, and contractors to ensure that a uniform EEM program reaches the intended market.
- DOE to assist States in *updating and enforcing residential building codes* beginning in 1994. Code enforcement, which lags in many regions, is an effective tool to increase the energy efficiency of homes.
- DOE, USDA, and DOD and their industry partners to take *Cool Communities* beyond the pilot stage. This program uses a simple idea — that shade trees can reduce air conditioning loads — and promotes urban tree planting where the energy saving benefits are highest. This program can also help commercial buildings save energy.

Industrial Energy Efficiency Strategy

The nation's industries consumed 39 percent of the nation's end-use energy in 1990, including 35 percent of electricity generated. Since two-thirds of the sector's electricity use is for motors, industrial motors use over 20 percent of all U.S. electricity generation. Including the emissions from electricity generation, the industrial sector accounted for 33 percent of U.S. CO₂ emissions in 1990. A small number of major manufacturing groups — primary metals, petroleum refining, chemicals, pulp and paper -- account for about 70 percent of industrial energy use.

Since the 1970's, the Federal government has funded a large research and development program for energy efficiency and waste-reduction technologies in the industrial sector. The Action Plan establishes working partnerships with American industry to help get those improvements off of the drawing board and on to the factory floor.

PRESIDENT CLINTON IS DIRECTING:

- DOE to mount the *Motor Challenge* -- an industry-driven collaborative program to test, verify, and disseminate information on the cost saving potential of industrial motor systems — and to get commitments from American industry to use them.
 - DOE will prepare 25 showcase demonstrations within the next nine months.
 - The Department will initiate a nationwide marketing effort following evaluation of the showcases, beginning in 1996.

CASE STUDY

THE MOTOR CHALLENGE

Linking Industrial Competitiveness with Environmental Objectives

The Motor Challenge program provides industry leaders an opportunity to demonstrate how improved efficiency of electric motor systems can enhance productivity and profitability while promoting national objectives of energy efficiency, competitiveness, and environmental quality. The program is a collaborative effort between the Federal government, motor manufacturers, electric utilities, and industrial motor system users. The purpose of the program is to demonstrate, evaluate, and accelerate the market penetration of efficient electric motor systems (EMS), which include electric motors, adjustable speed drives, and motor-driven equipment and processes. By promoting a systems approach to electric motor system design and implementation, the program addresses the application needs of industry.

The Motor Challenge expands upon the DOE Electric Motor Systems (EMS) Program, through which DOE and the Electric Power Research Institute (EPRI) convened a Roundtable with stakeholders in EMS markets. The Roundtable discussion led to three major conclusions:

- A systems approach to motor applications presents larger and more profitable opportunities for increasing industrial motor efficiency.
- The institutional incentives of EMS decisions do not favor taking a systems approach.
- Industry users lack the information and analytic methodologies that could confirm the economic benefits of adopting a systems approach.

In consultations with industry held during the White House Conference on Global Climate Change, DOE proposed to address these opportunities and barriers with an industry-driven Motor Challenge. The program will begin with three main activities: a **Motor Challenge Partnership** involving informational exchange activities; **Showcase Demonstrations** of efficient electric motor systems; and the development of a **National Electric Motor Systems Database** to facilitate the exchange of performance data and to recognize industry's successes in implementing efficient electric motor systems. The Database will be coordinated with the voluntary reporting system of greenhouse gas emission reduction under Section 1605 (b) of the Energy Policy Act.

Companies participating in the Motor Challenge will leverage their existing programs to improve efficiency, productivity, and overall competitiveness. They will gain access to the latest technology developments, and, together with DOE, will help put information into the hands of industry managers so that industry can implement the most efficient and cost-effective choice for their specific applications.

Recognition of individual industrial leaders in motor system efficiency is one of the key elements of the Motor Challenge program. By highlighting excellence in motor system application, other industrial companies will benchmark their efforts to the recognized leaders.

- DOE to create "*Golden Carrot*" programs for industrial equipment. By helping to pool financial incentives and purchasing power, these programs can stimulate rapid commercialization of new energy efficient equipment.
 - These programs are modeled on the successful utility/government collaborative that brought the super-efficient refrigerator to market,
 - DOE will prioritize candidate technologies this year and help launch individual Golden Carrot challenge programs by the end of 1994.
- EPA and DOE to expand voluntary source reduction and product recycling programs targeted at industrial producers. Using recycled or waste materials consumes less energy than manufacturing products from virgin materials.
- EPA and DOE to launch the *Climate-Wise* program, a performance-based recognition program based on the premise that government can spur innovation by establishing goals and allowing individual firms to identify the most cost-effective means to achieve them. Through Climate-Wise, EPA and DOE will recognize and encourage a broad array of emission reduction measures, including industrial process changes, raw materials and fuel substitutions, and innovative transportation programs.

TRANSPORTATION ACTIONS

The combustion of fossil fuels to move people and goods consumed 35 percent of the nation's energy in 1990 and produced over 32 percent of U.S. CO₂ emissions. The expected increase in demand for transportation services over the next decade will hamper efforts to abate urban air pollution and to reduce U.S. reliance on foreign oil. Transportation will be the fastest growing source of CO₂ emissions through the year 2000. The Action Plan contains a package of initiatives to curb growth in transportation sector emissions by slowing the growing demand for vehicle travel and enhancing the market for more efficient technology and cleaner fuels. (A comprehensive review of transportation options is also part of the long-term strategy described in a later section.)

PRESIDENT CLINTON IS DIRECTING:

- The Administration to prepare legislation providing workers the option of receiving the *cash value of employer-paid parking* as a financial incentive to reduce solo commuting where alternatives exist.
 - Workers who get free parking from their employers will have the opportunity to take the benefit in the form of taxable income (they can "cash-out"), increasing commuter freedom of choice. Employees who continue to utilize free parking are not affected by the program.
 - The incentive will not increase the cost of doing business — employer provided parking will still be deductible from corporate taxes if chosen by the employee. EPA may consider reducing the reporting burden of the Employee Trip Reduction programs mandated under the Clean Air Act if the "cash-out" achieves similar results.

- Increased tax receipts from employees choosing to "cash out" their parking benefit provide revenues that help reduce the Federal deficit.
- Because the program will focus on parking that is purchased or leased by firms for their employees, rural areas will not be affected by the program. Firms with fewer than 25 employees will be exempt. The Administration will consider options to expand the program where emission reduction benefits are highest.
- EPA, in consultation with DOT, to draft guidance documents that identify the air quality benefits of *innovative transportation strategies* to reduce *vehicle miles travelled (VMT)*. These will be used by states and cities in their clean air program development.
 - Some states and cities have experimented with innovative programs, such as congestion pricing tolls and mass transit finance, which may have significant CO₂ as well as urban air pollution benefits.

EPA can help states and cities evaluate how well such strategies can work in attaining clean air quality standards, thereby encouraging the adoption of innovative programs.

- The Department of Transportation to institute a *tire labeling program* to help consumers identify tires that have low rolling resistance. Consumers often purchase replacement tires that have 20% more rolling resistance than original equipment tires, reducing their fuel economy by up to 4%. With the labeling program, consumers will readily have the information they need to make better decisions on how to save gas, save money, and protect the environment.

ENERGY SUPPLY ACTIONS

The fuels used to meet U.S. energy needs vary in their greenhouse gas emissions. Among fossil fuels, natural gas emits the least amount of CO₂ per unit of energy provided, and renewable energy sources such as solar, wind, geothermal, hydroelectric and biomass energy, release no net CO₂. Nuclear power, which currently provides over 20 percent of electricity generated, will continue to play a key role in limiting CO₂ emissions from electricity production. Newer technologies can also increase the efficiency of generating and distributing electricity. Increased efficiency lowers the amount of greenhouse gases emitted by reducing the amount of fuel required to generate and deliver electricity to customers.

CASE STUDY

CALIFORNIA WINDPOWER Pollution-free Energy Today

We believe that we are on a path of technical and financial progress that will define a completely new market for wind power — a market in which it will be commercially viable generation on the basis of fuel savings alone.

Dale Osborn
President
U.S. Windpower, Inc.

There are over 1,500 megawatts of privately owned wind generating capacity in operation in California alone, enough to meet the residential needs of about 1,000,000 people - more than the population of San Francisco or Washington DC. By the mid-1990's sales of wind-generated electricity are expected to double. California's wind power plants produce about 1.2 percent of Pacific Gas and Electric's estimated consumption and provides up to 8 percent of their load. Wind power plants in California save the energy equivalent of 4.4 million barrels of oil each year while producing no air pollution.

Today's modern wind turbines are increasingly reliable, and are available more than 95 percent of the time - as compared to only 50-60 percent in the early 1980s. Costs have been reduced from almost 25 cents per kilowatt-hour in 1980 to a range of 7-9 cents per kilowatt-hour today, with near-term prospects to reach 4 cents per kilowatt-hour by 2000. New wind turbine blades, with airfoils designed at the National Renewable Energy Lab specifically for wind turbines are now on the market. Field tests show a 20 percent increase in energy capture over earlier blades.

DOE's windpower programs support applied research in the aerodynamic properties and structural dynamics of wind turbines. The research covers a broad spectrum of activities to increase the efficiency and cost-effectiveness of turbines and blade designs, and in the design of materials. Technical improvements from industry experience and the DOE Windpower program have played an important role in reducing the cost of wind-generated electricity. DOE and industry engineers have worked together to design new airfoils that capture 15-25 percent more energy from the wind than earlier commercial designs, and the industry has greatly improved wind turbine designs and reduced mechanical failures caused by large aerodynamic loads. DOE's Windpower program is also helping to develop markets for wind energy through assessments of U.S. wind resources.

The energy industry is entering an era of unprecedented change due to market and regulatory shifts. The Energy Policy Act and actions taken by the Federal Energy Regulatory Commission (FERC) have increased competition in a variety of energy markets, increasing the efficiency of energy supply. New requirements under the Clean Air Act have prompted a shift to cleaner fuels. Federal R&D into new energy technologies, primarily through DOE, continues to help the industry meet environmental and market challenges.

The President's Climate Change Action Plan includes a number of new actions to reduce the amount of CO₂ emitted from energy production and use. The Administration will increase the use of natural gas; encourage the commercial application of renewable energy resources; make more efficient use of our existing hydroelectric resources; and reduce the amount of energy lost in electricity transmission.

Natural Gas Strategy

Natural gas, an abundant domestic fuel, emits less CO₂ per unit of energy provided than either oil or coal. The Administration recognizes the environmental, economic, and national security benefits of encouraging the use of natural gas.

PRESIDENT CLINTON IS DIRECTING:

- EPA to *encourage the use of natural gas as a pollution control strategy* under the Clean Air Act. This initiative will lower the cost of combatting the severe ozone pollution problem plaguing many of our cities in a way that also reduces greenhouse gas emissions. As part of that effort, EPA recently issued guidelines to urge state and local pollution control agencies to allow the use of natural gas in the summer in existing coal- and oilfired power plants. EPA will examine additional regulatory options where shifts to cleaner fuels could provide environmental benefits and cost savings.
- DOE to accelerate the *commercialization of high-efficiency gas technologies* such as fuel cells through joint ventures with utilities, research organizations and technology developers to fund demonstrations and market entry initiatives.
- DOE to work with the Federal Energy Regulatory Agency (FERC) to continue to facilitate the implementation of reforms that will increase the availability and use of natural gas.

Renewable Energy Strategy

Renewable energy sources include solar energy, biomass energy (wood, wood waste, and energy crops), geothermal energy, hydroelectric power, and related energy sources that emit no net greenhouse gases. Through increased funding and utilization of incentives included in the Energy Policy Act of 1992 to promote the use of renewable energy, the Administration is already laying the groundwork for a future that can rely on these resources. The Action Plan features new initiatives to accelerate the widespread commercial deployment of renewable energy sources.

PRESIDENT CLINTON IS DIRECTING:

- DOE to form a *renewable technology consortium* with utilities that will increase the emphasis on commercialization programs for windpower, photovoltaics, biomass, and geothermal energy, beginning in 1994.
 - DOE will facilitate collective purchases of renewable energy technology by States, utilities, and other interested firms. Mass purchase strategies enable equipment manufacturers to increase their production capacity and reduce their unit costs — which will in turn further broaden the market for the technologies.
 - This action will enhance the near-term economic returns from Federal energy R&D programs.
- The Administration to propose legislation to enable private developers to invest in environmentally sound upgrades at existing *Federal hydroelectric projects*, and to sell the incremental power at market rates.
 - Significant technological potential exists for increasing generation at hydroelectric facilities (without changing stream flows), but institutional barriers have stifled efforts to make these profitable efficiency upgrades.
 - Private investments will increase generation from hydroelectric facilities, reducing the need for fossil fuel-fired generation.
 - Lease payments will help reduce the Federal deficit.

Electric Distribution Efficiency Strategy

In 1991, about 7.4% of U.S. electric generation was lost while being distributed from power plants to end-users. When transmission and distribution losses are reduced, less electricity is generated to meet end-use demands, which reduces CO₂ emissions. The Federal Energy Regulatory Commission is currently implementing changes in the Federal Power Act contained in the Energy Policy Act of 1992, which will help promote the efficient use of the transmission system. The Action Plan focuses on increasing the adoption of more efficient transmission and distribution equipment.

PRESIDENT CLINTON IS DIRECTING:

- DOE to promulgate *efficiency standards for high-efficiency electricity transformers* used to convert high voltage transmission power to lower voltage power for end users. Pending the results of a study which will be completed by March 1994, DOE will implement new cost-effective standards for replacement of utility transformers by 1996.
- EPA to implement an "*Energy Star*" *identification program* to encourage the accelerated deployment of the highest efficiency transformers.

Utility Industry Strategy

The energy demand and supply programs outlined above rely on an assumed private sector response to a collection of government initiatives. The analysis of their impact assumes that a favorable climate exists for the penetration of technology and that the programs will be supported by electric utilities. In order to ensure that these programs deliver the estimated impacts, and to enhance the prospects for early emission reductions, DOE has begun to forge commitments with electric utilities to limit greenhouse gas emissions. In addition, DOE and EPA will expand their efforts to encourage supportive state regulatory actions.

PRESIDENT CLINTON IS DIRECTING:

- DOE to enter into *Climate Challenges* with electric utility companies who voluntarily commit to (1) return greenhouse gas emissions to 1990 levels by the year 2000 or (2) limit emissions under strict performance measures. This partnership links accountability with maximum flexibility to give participating utilities an opportunity to demonstrate cost effective emission reduction efforts.
 - DOE has received letters of intent from seven electric utilities to enter into agreements to return greenhouse gas emissions to 1990 levels or below by 2000. An additional 50 utilities have signed letters of intent to enter into alternative performance agreements to limit greenhouse gas emissions. In total, these utilities represent about 60% of U.S. electricity generation and about 60% of CO₂ emissions from this sector, and the Administration expects to attract additional partners, including independent energy producers.
 - The Climate Challenge builds upon an innovative government/industry partnership authorized under Section 1605(b) of the Energy Policy Act of 1992, in which participants report historic emissions baselines and submit periodic reports of actions taken to reduce greenhouse gas emissions.
 - Participating utilities will have flexibility to implement a portfolio of emissions reduction measures -- including enhancing the efficiency of generation and transmission, switching to lower-carbon fuels, investing in renewable generation, enhancing the performance of existing hydroelectric and nuclear capacity, expanding demand-side management programs, undertaking forestry projects, promoting electrotechnologies, and international projects. To the extent that utilities invest in international projects to help meet their voluntary commitments, they could provide an important source of private sector participation in the U.S. Initiative on Joint Implementation.
- DOE to *Expand Utility Integrated Resource Planning (IRP) Assistance* to provide a foundation for other Federal and State programs, and to encourage a supportive regulatory environment for utilities entering Climate Challenges. In 1994, DOE will expand the IRP programs authorized in the Energy Policy Act. Key elements of the expanded IRP program include:
 - Increasing Federal technical and financial support to State Regulatory Commissions to make utility investments in energy efficiency as profitable as supply side investments and for more effective demand and supply side planning;

- Increasing Federal support for removing regulatory barriers to increased use of renewables and natural gas.

METHANE AND OTHER GASES

Methane contributes about 12 percent of the U.S. greenhouse gas emissions. The primary sources of methane emissions in the United States are landfills, coal mines, natural gas systems, and domesticated livestock.

Methane Recovery and Reduction Strategy

In many cases, methane that would otherwise be emitted to the atmosphere can be significantly reduced through the use of cost-effective management methods or used to generate power. Therefore, methane control options offer tremendous opportunity to reduce greenhouse gas emissions at low cost or even at a profit. Several EPA programs are already delivering cost effective methane reductions. The Action Plan builds on those programs and establishes new initiatives to reduce methane emissions from all of the major methane sources.

PRESIDENT CLINTON IS DIRECTING:

- EPA to expand the *Natural Gas Star* partnership to include additional transmission and distribution companies and production companies.
 - The new Natural Gas Star will set an industry-wide performance benchmark for leakage and emission control throughout the entire natural gas system.
 - EPA will complete a full analysis of barriers to complete implementation and launch a marketing campaign for producers and processors during 1994.
- EPA to formulate a tough rule *to reduce methane emissions from landfills* under section 111 of the Clean Air Act. This rule, which will be completed this year, will increase the amount of organic compounds that must be recovered by landfills and will result in additional recovery of methane gas.
- EPA to launch new *outreach and technical assistance programs for landfill and coal mine owners*. Studies indicate that many coal mine and landfill owners could make a profit by using or selling the methane they release. However, most have not installed recovery systems because of institutional, regulatory, and financial barriers and a lack of technical support. These outreach programs will be reinforced and supported by DOE landfill and coalbed methane R&D programs.
- EPA and USDA to launch *AgStar* — a partnership effort with beef, dairy, and swine farmers to supplement on-farm energy needs with methane produced from animal manure. The AgStar program will begin this year, and include farms across the country.

HFCs, PFCs and Nitrous Oxide Control Strategies

Due to high global warming potentials, long atmospheric lifetimes, and increasing emissions, hydrofluorocarbons (HFCs) are a growing contributor to the climate change problem. HFCs are produced commercially as a substitute for ozone-depleting CFCs and are also emitted as a by-product of HCFC-22 production (another CFC substitute). Perfluorocarbon emissions (PFCs), primarily from aluminum smelting, are also potent greenhouse gases. HFCs and PFCs are projected to grow from 20 MMTCE in 1990 to 45 MMTCE in 2000. Nitrous oxide emissions, mostly from fertilizer and chemical manufacture, currently account for roughly 3% of U.S. greenhouse gas emissions.⁸

The United States is the first nation to articulate a national strategy to control the emissions of HFCs and PFCs. The plan uses a combination of partnership efforts and regulatory mechanisms to minimize the future contribution of HFCs and PFCs to global warming, without disrupting the orderly and cost-effective transition away from CFCs.

PRESIDENT CLINTON IS DIRECTING:

- EPA to use its authority under the Clean Air Act to *narrow the scope of uses allowed for HFCs* with high global warming potentials where better alternatives exist, and to initiate rulemaking in early 1994.
- EPA to establish a partnership with chemical manufacturers to assist their efforts to *limit by-product emissions of HFCs* by 50 percent from their manufacturing operations.
- EPA to forge a *new partnership with aluminum producers* to identify emission reduction opportunities and to reduce PFC emissions by up to 50 percent.
 - USDA to launch a new partnership with American farmers to *improve the efficiency of fertilizer management*, which will result in lower emissions of nitrous oxide from soil.
 - USDA will conduct and complete field experiments regarding bacterial denitrification, and test management options to improve nitrogen use efficiency. Demonstration projects and an outreach campaign using nationwide USDA outlets will begin by 1996.

FORESTRY ACTIONS

Atmospheric CO₂ concentrations are the net result of continuous emissions and uptake that occur through natural processes and human activities. Future concentrations of CO₂ in the atmosphere — the key factor of the global warming threat — can be limited both by reducing emissions and by increasing the amount of annual uptake by natural systems, sometimes called carbon "sinks." Trees, plants, and soils absorb and store CO₂ from the atmosphere, and are a significant carbon sink.

⁸ The current and future emission levels of these gases are subject to high degree of uncertainty. This same uncertainty affects the technical basis for estimating emission reductions from programs.

CO₂ emissions occur when the carbon stored in these sinks is released — for example when trees are harvested and the wood is burned for energy. Protecting the carbon stored in these forest reservoirs, therefore, can prevent CO₂ emissions from occurring. The Administration has already taken significant steps to protect carbon sequestered in forests. Lower harvests in old-growth forests help prevent CO₂ emissions, even if accompanied by increased harvests elsewhere, because old-growth forests have higher carbon densities than second growth forests. The shift toward ecosystem management also favors timber harvest methods that inflict less damage and helps retain carbon on forest lands. Sink protection actions are very cost effective methods for limiting net CO₂ emissions.

Forestry Strategy

The Action Plan includes several programs to maintain carbon sequestered in forest ecosystems, which provide about 9% of the emission reductions needed to reach the greenhouse gas target in 2000. These include an expanded program to encourage better management of private forests and programs to increase the recycling of wood fiber.

PRESIDENT CLINTON IS DIRECTING:

- USDA to *increase technical and economic assistance to private non-industrial landowners* to encourage better management and greater tree planting. Small private landowners — some with only a few acres of forests — generally do not manage their holdings intensively. About 16% of these forests are in poor health, and many are harvested for short term economic gain without replanting for maximal growth. Better management and accelerated planting programs will decrease carbon emissions from private non environmental benefits over the long term.
 - USDA will expand management assistance under the Stewardship Incentive Program by funding additional free technical consultations and management plans for small landowners. Over the next several years, USDA will also expand tree planting programs for non-industrial forest owners that provide up to 75 % of the costs.
- USDA and EPA to *expand voluntary source reduction and paper recycling programs* and to increase research into recycling technologies, which help reduce the amount of paper waste generated and to increase the fraction of waste paper recycled. These programs pay a double dividend for climate protection: source reduction and recycling lowers the demand for virgin fiber and reduced harvest levels decrease CO₂ emissions from forests, while recycling paper consumes less energy than manufacturing paper and other products from virgin fiber.

JOINT IMPLEMENTATION

Efforts undertaken cooperatively between countries or entities within them to reduce net greenhouse gas emissions — called joint implementation — hold significant potential for combatting the threat of global warming and promoting sustainable development. Joint implementation is recognized under the Framework Convention on Climate Change (the Climate Convention) and is an approach open to all Parties to the Convention.

Joint implementation could potentially achieve greater emission reductions than might be possible if each country pursued only domestic actions, and could achieve these reductions more cost-effectively. Joint implementation may also spur technology cooperation — increasing developing countries' access to energy efficiency and renewable energy technologies while stimulating export markets for industrialized countries. At the same time, significant questions arise about what kinds of activities might take place under the rubric of joint implementation: whether these would produce real reductions; whether they would be "new and additional" to ongoing development assistance or private business transactions; how to measure and track net emission reductions achieved; how to assure that reductions in one place do not give rise to increases in another; and how to assure that net reductions will not be lost or reversed through time.

The Intergovernmental Negotiating Committee, the body that negotiated the terms of the Climate Convention, took up the issue of joint implementation for the first time during its Eighth Session in August 1993. The Climate Convention calls upon the Conference of the Parties to adopt international criteria for joint implementation at its first session, tentatively scheduled for late March 1995. International efforts to develop criteria for joint implementation will clearly benefit from real world experience. At the same time, a number of U.S. firms, especially electric utilities considering voluntary emission reduction commitments, have indicated their interest in international projects.

Joint Implementation Strategy

The Climate Change Action Plan will achieve the goal of returning U.S. greenhouse gas emissions to 1990 levels by the year 2000 with domestic actions alone. However, the Administration recognizes the enormous potential for cost-effective greenhouse gas emission reductions in other countries, and the promise of joint implementation can only be realized if pilot projects are evaluated under workable criteria that avoid the pitfalls mentioned above. The Administration is therefore announcing a pilot program — the U.S. Initiative on Joint Implementation (USIJI). The primary purpose of the U.S. initiative is to help establish an empirical basis for considering approaches to joint implementation internationally and thus help realize the enormous potential for joint implementation both to combat the threat of global warming and to promote sustainable development.

PRESIDENT CLINTON IS DIRECTING:

- The Department of State, in consultation with other Agencies, to develop the U.S. Initiative on Joint Implementation (USIJI) as a pilot program.
- The Department of State to publish the initial guidelines for the USIJI in the Federal Register for public comment. The USIJI ground rules are found in Appendix II and include the following key features:
 - The USIJI will provide a mechanism for investments by U.S. firms and potential government assistance to be evaluated for net greenhouse gas emission reductions.
 - The USIJI will establish an interagency evaluation panel to certify net emission reduction estimates from qualified projects

- The USIJI will adhere to strict criteria to evaluate potential emission reductions in order to maximize international acceptance of emission reductions.
- Net emission reductions achieved as a result of projects developed under the USIJI will be measured, tracked, and scored. An accounting of these reductions will be part of the U.S. National Action Plan.
- The U.S. Initiative will be evaluated and assessed within two years of its inception or within six months of adoption of international criteria for joint implementation by the Conference of the Parties under the Climate Convention, whichever is earlier.

MONITORING, EVALUATION, AND ADJUSTMENT

This Action Plan represents a major mobilization effort to stimulate federal agencies, companies, state and local governments, and citizens across the nation to do their part in addressing the challenge of global warming. But this is only the beginning. The nature of the climate change problem is inescapably long-term and only partly known today. We must estimate -- with some uncertainty - the future effectiveness and economic impacts of policies we adopt now. In order to meet the goal of returning greenhouse gas emissions to 1990 levels, the President is committing his Administration to periodically evaluate the emission trends and program effectiveness, and to pursue additional policy initiatives if the trends indicate that our progress is insufficient to attain our goal. This is not a "set and forget" plan.

There are several mechanisms for monitoring emission trends. First, the Department of Energy, the Energy Information Administration, the Environmental Protection Agency, and the Federal Energy Regulatory Commission continuously gather and analyze data on energy production, consumption, and greenhouse gas emissions. The Clean Air Act Amendments of 1990 require that electric utilities employ continuous emission monitoring of CO₂ emissions. Companies participating in the Energy Policy Act Section 1605(b) reporting program will supply timely information regarding their efforts. This will include utilities who take up the Climate Challenge and industrial firms who report their programs under the Climate Wise program. Finally, companies participating in the USIJI will provide information on the progress of overseas projects that may yield measurable emission reductions.

The Clinton Administration will review progress under the Action Plan on a biennial basis to report on current trends, adapt existing programs to evolving circumstances, and if necessary, propose additional administrative, regulatory, or legislative actions. This Action Plan is not a one-time policy development exercise but rather begins a process of continual improvement in energy, environmental, and economic policy. The Administration will continue to seek out opportunities for emission reduction that provide for economic growth and job creation.

PRESIDENT CLINTON IS DIRECTING:

- The Office on Environmental Policy to chair an interagency task force to monitor and evaluate the progress made under the President's Climate Change Action Plan.

The President is directing this task force to oversee the preparation of the U.S. National Action Plan (NAP) required by the Framework Convention on Climate Change, and

recommend revisions to the current Action Plan as necessary. Depending on when the Convention enters into force, the U.S. National Action Plan could be required in as little as one year.

After the United States submits the U.S. NAP to the Conference of the Parties to the Convention, the task force - coordinating with the Department of State — will oversee the preparation of reports to the Conference of the Parties and will evaluate the progress made under the Action Plan every two years or when called upon by the Conference of the Parties.

The White House will convene a conference in six months, inviting public and private partners committed to addressing climate change. These will include businesses that buy or sell technologies or products that reduce greenhouse gases, government program managers responsible for each of the actions outlined in the Action Plan, and the public. The conference will provide a showcase to demonstrate progress, announce milestones, and identify new opportunities to cut greenhouse gas emissions.

LONG TERM STRATEGIES FOR REDUCING EMISSIONS OF GREENHOUSE GASES

The initiatives outlined in this Action Plan will continue to reduce emission levels from projected levels beyond the year 2000. However, this plan is unlikely to stabilize emissions at 1990 levels in the longer term under reasonable assumptions regarding economic growth, the diffusion of existing technologies, and new technology development. Therefore, the Administration will develop policies to address the longer term trends in greenhouse gas emissions. These policies must address technologies of energy supply and use, and condition markets for the long-term transition away from activities, fuels and technologies that generate large emissions of greenhouse gases.

The policies contained in the Action Plan are directed primarily at creating effective markets for investments in existing or nearly commercially-available technology that reduce greenhouse gas emissions. The core of a long term strategy must ensure that a constant stream of improved technology is available and that market conditions are favorable to their adoption. The Action Plan is likely to stimulate a modest acceleration in technology development, but this impact is not readily quantified. Such gains will lay the foundation for the development of technologies that could contribute to significant reductions in greenhouse gas emissions in both the United States and abroad. But a long term economic and technology development strategy must quickly be developed in order for progress to continue on greenhouse gas emission reductions into the next century.

Research and development into the technologies that could contribute to greenhouse gas emission reductions will be a critical part of the long term effort. Research priorities to reduce energy demand include advanced building systems, transportation equipment and systems, and manufacturing technology to reduce energy and material requirements. Research priorities for low-carbon energy supply technologies could include sustainable biomass energy systems, advanced natural gas turbine and fuel cell technologies, cogeneration systems, energy storage systems, renewable energy technologies, hydrogen fuel systems, and continued research into nuclear safety and waste disposal options that could maintain the option of commercial nuclear power.

The Administration will begin a thorough evaluation of budget, technology, and economic policies that directly or indirectly affect future greenhouse gas emission trends. The mitigation of greenhouse gases in the U.S. and abroad should become a fundamental guiding principle of economic, energy, environmental, and international policies. A key component of the efforts will be an extensive consideration of transportation sector options. Much of the anticipated growth in greenhouse gas emissions after 2000 will be in the transportation sector. Even with actions taken under this plan, we expect that overall use of automobiles and trucks will increase as vehicles are added to the nation's fleet and as vehicles are driven greater distances. In order to continue emission reduction trends beyond the turn of the century, additional cost-effective measures will be needed to reduce greenhouse gas emissions of individual vehicles and to increase America's transportation options, so that personal mobility can be enhanced while private vehicles can be driven less.

On September 29, 1993, the Administration announced a bold initiative aimed at dramatically reducing the impact of automobiles on the environment. This historic partnership with the major U.S. automakers has the goal of producing a new generation of world-competitive automobiles that are up to three times more fuel efficient than today's models — and therefore would emit one-third the CO₂ of comparable cars today - while meeting all forthcoming standards for safety and conventional air pollutants. If successful, this highly efficient new generation of automobiles could begin to come into widespread production by 2010. This initiative holds out enormous long-term progress for the health of both the global environment and the U.S. automobile industry. But over the next 15 years, additional measures will be required to curb the rising trend of greenhouse gas emissions from the transportation sector.

PRESIDENT CLINTON IS DIRECTING:

- The White House National Economic Council, the Office on Environmental Policy and the Office of Science and Technology Policy to co-chair a long-term strategy working group to examine all budget, technology, R&D, regulatory and economic policies that could impact greenhouse gas emission levels beyond the year 2000. The task force will make initial recommendations by the end of 1994.
- The National Economic Council, the Office on Environmental Policy, and the Office of Science and Technology Policy to co-chair a process, to be completed not later than one year from issuance of this plan, to develop measures to significantly reduce greenhouse gas emissions from personal motor vehicles, including cars and light trucks.
 - The process will involve the Departments of Transportation and Energy, the Environmental Protection Agency, and all relevant departments and agencies in the Federal government. The Administration will also strongly encourage the full participation of the automobile industry, state and local government, the environmental community, and others with potential solutions to offer.
 - The Administration will look at the full range of options under existing authority as well as alternative methods to cost-effectively reduce total greenhouse gas emissions attributable to personal motor vehicle use, while meeting or exceeding applicable vehicle safety and clean air requirements.

The goal will be to identify and implement strategies that yield significant greenhouse gas emission reductions from personal motor vehicles, including cars and light trucks. Included in the issues to be examined will be a combination of regulatory and non-regulatory measures to improve new vehicle fuel efficiency in an amount equivalent to at least 2% per year over a 10 to 15 year period.

APPENDIX I
DESCRIPTION OF ACTION PLAN ANALYSIS

Summary of Modeling and Estimation Process

The assessment of emissions reductions resulting from the plan was carried out using a three-stage process:

1. Establish baseline emissions projections based on projected activity levels in energy and other markets;
2. Analyze individual emission reductions actions and groups of related actions; and
3. Execute an integrated analysis of energy-related actions to account for synergies, overlaps, and market interactions.

Baseline Projections

Baseline projections are based upon a set of specific assumptions about markets, technologies, and resources, such as GDP growth rates and oil and gas prices. There are four main types of assumptions underlying the projections:

- Economic factors, which include GDP growth rates, world oil prices, and other assumptions;
- Energy resources, which include proved reserves and undiscovered resources;
- Market behavior, reflecting the demand and supply decisions of energy market participants as influenced by prices, standards, and partnership programs; and
- Technology factors, which include information on the costs of energy-consuming and producing technologies, their performance, and when they will be commercially available.

The starting point for baseline development was the 1993 Annual Energy Outlook (AEO) of the Energy Information Administration, an independent statistical and forecasting unit within the Department of Energy. Both the AEO forecast and its underlying assumptions were reviewed by an interagency analysis team and shared with participants in the public workshops. Based on public comments and internal review, the interagency analysis team modified assumptions (1) regarding economic growth and oil prices to maintain consistency with Administration budget forecasts, and (2) specific sectoral trends, such as the assumed growth rate for commercial floorspace to more closely reflect market conditions.

CURRENT ACTIONS THAT REDUCE GREENHOUSE GAS EMISSIONS

The Action Plan addresses actions that are needed to return U.S. greenhouse gas emissions to 1990 levels by the year 2000. However, many current activities and programs contribute to lower emissions; these actions are already included in the baseline emission forecast. Actions already incorporated into the baseline emission projections include:

- Energy efficiency standards and codes authorized by the Energy Policy Act:
 - manufactured housing
 - showerheads
 - commercial buildings: heating, ventilation, and air conditioning
 - fluorescent and HID lamps
 - luminaries and office equipment (labels)
 - electric motors
 - distribution transformers
 - assisting states in developing commercial building codes
- EPA partnership programs (baseline funding levels):
 - Green Lights
 - Energy Star Buildings
 - Energy Star Computers
 - Golden Carrot Refrigerator Program
 - Methane Programs
- Low income weatherization
- Research and development for energy efficiency (DOE):
 - advanced building technology
 - advanced heat pumps
 - waste reduction
 - pulp and paper manufacture
 - electric drives
- Industrial grants and audits program authorized in the Energy Policy Act
- Increased federal building energy efficiency
- Increased participation in DSM activities by Federal Power Marketing Administration

Analysis of Actions and Action Groups

Actions included in the plan affect virtually all energy-using activities in the economy. Interagency expert teams used a wide variety of modeling tools in developing initial impact estimates. External analyses developed through the public workshop process were reflected in the analytical exercise, and an ongoing dialogue with non-governmental experts was maintained throughout the process.

In some cases, several actions jointly promote the same type of energy efficiency improvement. For example, increased lighting efficiency is promoted through standards under the Energy Policy Act, utility-sponsored demand side management programs authorized by state regulators, government and corporate energy management programs, the "Green Lights" partnership program, and private initiative. While the multiplicity of programs (especially when coupled with bottom-line corporate and utility commitments) raises confidence as to the likelihood of achieving significant investments in lighting efficiency, it is clear that simple summation of individual program effects could overstate actual impacts. To avoid double-counting, such directly overlapping actions were evaluated jointly rather than individually by the interagency analysis team.

Integrated Analysis

Most energy-related options affect more than one sector or fuel; changes in one sector often affect fuel prices, which in turn affect energy demand and supply in other sectors. In addition, policy options usually do not work in isolation from other options; some options are synergistic, with a total effect that exceeds the sum of their individual effects, while others have overlapping or offsetting effects. For this reason, capturing interactions among energy prices, supply, and demand is essential.

The IDEAS (Integrated Dynamic Energy Analysis Simulation) model was used as a modeling tool for the integrated analysis of energy-related options. IDEAS, an improved and updated version of the earlier FOSSIL2 model, is a bottom-up technology-by-technology model that links energy supply and demand through equilibrium market prices. The model was initially calibrated to the 1990 and 2010 AEO93 forecast, then adjusted for the differences in assumptions noted in the discussion of baselines and for policies already reflected in the Clinton Administration program.

The effects of supply-side actions on demand and prices are straightforward. In general, increases in supplies of carbon-free electricity (e.g., renewables and nuclear) are projected to displace the use of coal, oil, and natural gas in electricity generation. Switching toward less carbon-intensive fossil fuels (e.g. substitution of natural gas for coal or oil) and reductions in transmission losses are other ways to lower carbon emissions.

On the demand side, reductions are achieved by imposing efficiency standards (building standards, lighting standards, and motor standards), using market incentives (integrated resource demand-side actions interact with supply-side actions in a manner that could either offset or reinforce reductions).

Research and development (R&D) measures have positive effects on energy conservation on both the demand and supply sides. These measures are generally synergistic with other conservation and energy efficiency initiatives. Given the lags inherent in research, development, initial commercialization, and

widespread market acceptance, the primary effects of R&D will only be realized after a considerable period. For this reason, the primary role of R&D actions in the plan is to contribute toward reduced emissions beyond 2000.

Uncertainty in Forecasting Future Emissions

Uncertainty regarding future levels of energy-related emissions arises from at least three distinct sources:

- The relationships between energy use, energy prices and economic activity levels may differ from those embodied in the AEO93 forecast used to calibrate the IDEAS model;
- Future conditions may diverge from the assumptions made regarding economic growth rates, world oil prices, U.S. energy resources, and the costs and performance of technologies used on the supply and demand sides of the energy market; and
- The actual impact of actions identified in the plan may differ from their projected effects.

The effect of uncertainty regarding future conditions can be illustrated by examining changes in assumptions regarding economic growth rates and future oil prices on projected baseline carbon emissions. Assumed economic growth rates determine the future gross domestic product (GDP), which reflects the level of various economic activities (e.g., commercial activity, industrial production, personal consumption, and travel). All of these economic activities involve energy. In general, higher GDP is associated with higher energy demand. A sensitivity case with GDP growth rates 0.5 percent per year lower than the baseline assumption reduced projected carbon emissions in 2000 by 29 million metric tons.

Assumptions about the world oil price over time are based on implicit assumptions about the availability of world petroleum reserves. Larger-than-expected petroleum reserves could be translated into lower world oil prices in the future. Consumption, related closely to oil prices, could increase significantly. A sensitivity case with constant real oil prices through 2000 in place of the 3.8 percent average annual increase between 1992 and 2000 in the base case increased projected carbon emissions in 2000 by 16 million metric tons.

The plan includes features to guarantee meaningful results notwithstanding the uncertainties inherent in projection and modeling. One key element of the plan is the Climate Challenge program by utilities who agree to limit greenhouse gas emissions. These commitments help reduce the uncertainty surrounding the estimated changes in energy consumption projected as individual initiatives, and provide assurance that the effect of the illustrated modeled actions is achieved, even if the approach ultimately required to do so differs from the modeled actions. The focus on bottom-line commitments recognizes that the ultimate success of federal efforts in leveraging end-use behavior will depend in large measure on the role of the utilities. Electric utilities alone already project expenditures of over \$23 billion on demand side management programs by 2000.

APPENDIX II

GROUNDRULES FOR U.S. INITIATIVE ON JOINT IMPLEMENTATION

The following describes the U.S. Initiative on Joint Implementation (USIJI), which shall be established as a pilot program.

Section 1 - Purpose

The purpose of the pilot program shall be to:

1. encourage the rapid development and implementation of cooperative, mutually voluntary projects between U.S. and foreign partners aimed at reducing net emissions of greenhouse gases, particularly projects promoting technology cooperation with and sustainable development in developing countries and countries with economies in transition to market economies;
2. promote a broad range of cooperative, mutually voluntary projects to test and evaluate methodologies for measuring, tracking and verifying costs and benefits;
3. establish an empirical basis to contribute to the formulation of international criteria for joint implementation;
4. encourage private sector investment and innovation in the development and dissemination of technologies for reducing net emissions of greenhouse gases; and
5. encourage participating countries to adopt more complete climate protection programs, including national inventories, baselines, policies and measures, and appropriate specific commitments.

Section 2 - Evaluation and Reassessment of Pilot Program

The pilot program shall be evaluated and reassessed within two years of its inception or within six months of adoption of international criteria for joint implementation by the Conference of the Parties to the United Nations Framework Convention on Climate Change, whichever is earlier.

Section 3 - Eligible Participants

A. Domestic

- 1) Any U.S. citizen or resident alien;
- 2) any company, organization or group incorporated under or recognized by the laws of the United States; or
- 3) any U.S. federal, state or local government entity.

B. Foreign

- 1) Any country that has signed, ratified or acceded to the United Nations Framework Convention on Climate Change;
- 2) any citizen or resident alien of a country identified in B(1) of this section;
- 3) any company, organization or group incorporated under or recognized by the laws of a country identified in B(1) of this section; or
- 4) any national, provincial, state, or local government entity of a country identified in B(1) of this section.

Section 4 - Evaluation Panel

- A. An Evaluation Panel is hereby established.
- B. The Evaluation Panel shall consist of eight members, of whom:
 - 1) one shall be an employee of the Department of Energy, who shall serve as Co-Chair;
 - 2) one shall be an employee of the Environmental Protection Agency, who shall serve as Co-Chair;
 - 3) one shall be an employee of the Agency for International Development;
 - 4) one shall be an employee of the Department of Agriculture;
 - 5) one shall be an employee of the Department of Commerce;
 - 6) one shall be an employee of the Department of the Interior;
 - 7) one shall be an employee of the Department of State; and
 - 8) one shall be an employee of the Department of the Treasury.
- C. The Panel shall be responsible for:
 - 1) Advising and assisting prospective U.S. and foreign participants on the technical parameters (including with respect to baselines, measuring and tracking) of projects submitted for inclusion in the USLJI;
 - 2) accepting project submissions from eligible U.S. participants and their foreign partners;
 - 3) reviewing and evaluating project submissions;
 - 4) approving or rejecting project submissions for inclusion in the USIJI, based on criteria contained in section 5;

- 5) providing written reasons for its decisions, which shall be made publicly available, within 90 days of receipt of a complete submission or resubmission;
- 6) certifying net emissions reductions estimated to result from projects; and
- 7) preparing an annual report of its activities, including a summary of approved projects.

Section 5 - Criteria

- A. To be included in the USIJI, the Evaluation Panel must find that a project submission:
 - 1) is accepted by the government of the host country;
 - 2) provides data and methodological information sufficient to estimate current and future net greenhouse gas emissions in the absence of, and as the result of, the project;
 - 3) will produce net reductions in greenhouse gas emissions that would not reasonably be likely to occur, based on available information, but for the proposed project, and if federally funded, is or will be undertaken with funds in excess of those available for such activities in fiscal year 1993;
 - 4) contains adequate provisions for tracking the actual net greenhouse gas emissions resulting from the project, and on a periodic basis, for modifying net greenhouse gas emissions reduction estimates and for comparing actual results with those originally projected;
 - 5) contains adequate provisions for external verification of the actual net greenhouse gas emissions resulting from the project;
 - 6) identifies any associated non-greenhouse gas environmental impacts/benefits;
 - 7) provides adequate assurance that actual net greenhouse gas reduction benefits accumulated over time will not be lost or reversed;
 - 8) provides for registration of the project in the national inventory established under section 1605 of the Energy Policy Act of 1992*; and
 - 9) provides for annual reports to the Evaluation Panel on the actual reduction achieved in net greenhouse gas emissions and on the share of such reduction attributed to each of the participants, domestic and foreign, pursuant to the terms of voluntary agreements among project participants.
- B. In determining whether to include projects under the USIJI, the Evaluation Panel shall also consider:
 - 1) the potential for the project to lead to net changes in greenhouse gas emissions elsewhere;

- 2) the potential positive and negative effects of the project apart from its effect on net greenhouse gas emissions;
- 3) whether the U.S. participants are net emitters of greenhouse gases within the United States and, if so, whether they are taking measures to reduce such net emissions; and
- 4) whether efforts are underway within the host country to ratify or accede to the United Nations Framework Convention on Climate Change, to develop a national inventory and/or baseline of net greenhouse gas emissions, and whether the host country is taking measures to reduce its net emissions of greenhouse gases.

* With respect to information received about such projects under section 1605, the Department of Energy will coordinate with the Environmental Protection Agency to enable it to fulfill its responsibilities under the Global Climate Protection Act of 1987 and the Clean Air Act, as amended.

CLIMATE CHANGE ACTION PLAN
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SUMMARY TABLE OF ACTIONS:
Description of Column Content

The table summarizes the environmental and financial impacts of the actions contained in the Climate Change Action Plan. The table columns contain the following information.

Action Number: This is a reference number used for the actions throughout the Plan.

Title: The name of the action.

Federal Outlay 1994 - 2000 (millions of nominal dollars): The Federal budget outlays for fiscal years 1994 through 2000 necessary to implement the option. Note that the dollar values listed in this column are not adjusted for inflation. Note: All other financial columns present values in undiscounted 1991 dollars.

Private Capital Investment 1994 - 2000 (millions of undiscounted 1991 dollars): Investment by the private sector associated with each action for calendar years 1994 through 2000.

Cumulative Value of Energy Savings: 1994 - 2000 (millions of undiscounted 1991 dollars): The figure shown in this column reflects either the value of energy saved or the change in fuel costs due to additional usage of low- or no-carbon fuels. Explanatory notes for individual actions are provided as necessary.

- For actions that save energy, the column shows the cumulative dollar value of the energy saved during calendar years 1994 through 2000 as a result of investments made during 1994 through 2000.
- For actions that cause additional use of low- or no-carbon fuels, the column shows the cumulative fuel cost differential for calendar years 1994 to 2000 as a result of using the lower no-carbon fuel as compared to the reference fuel.

Cumulative Value of Energy Savings: 2001 - 2010 (millions of undiscounted 1991 dollars): The concept of energy savings is the same as that reported in the previous column. Note that only those energy savings resulting from investments made in the 1994 to 2000 period are reported. Some of the actions will spur additional investments during the period 2001 to 2010. The energy savings from these additional investments are not reflected in this column.

GHG Reductions in 2000 (MMTCE): This is the amount the action lowers greenhouse gas (GHG) emissions compared to the reference case in the year 2000. Reductions are measured in millions of metric tonnes of carbon equivalent (MMTCE). The Global Warming Potential (GWP) index is used to compute carbon equivalents for other greenhouse gases.

Post-2000 Emission Reduction Potential: This column provides qualitative information on the long run emission reduction potential of the actions in the plan. The number of stars reflect the ratio of expected out year GHG reductions projected for 2000. The higher the ratio, the more stars are reported.

SUMMARY TABLE OF ACTIONS

Action #	Title	Federal Obligation FY 1994-2000 in \$millions	undiscounted 1991\$ (Millions)			GHG Reductions in 2000 (MMTCE)	Post-2000 Emission Reduction Potential
			Private Capital Investment 1994-2000	Cumulative Value of Energy Savings: 1994 - 2000	Cumulative Value of Energy Savings: 2001 - 2010		
COMMERCIAL DEMAND							
Partnership Programs							
1	Coordinate DOE Rebuild America & EPA Energy Star Buildings	\$190	\$6,300	\$2,800	\$11,900	3.1	*
2	Expand EPA's "Green Lights" Program	\$98	\$3,300	\$1,900	\$8,100	2.5	
Development, Commercialization, and Training							
3	Establish State Revolving Fund for Public Buildings	\$55	\$2,500	\$1,000	\$4,400	1.1	**
4	Expand Cost-Shared Demonstration of Emerging Technologies	\$60					
5	Establish Energy Efficiency and Renewable Energy Information and Training Programs	\$42	\$8,400	\$2,900	\$12,300	3.8	*
	Commercial Demand Combined Results	\$445	\$20,500	\$8,600	\$36,700	10.6	
RESIDENTIAL DEMAND							
Appliance Improvements							
6	Form "Golden Carrot" Market Pull Partnerships	\$193					
7	Enhance Residential Appliance Standards	\$0	\$19,500	\$9,400	\$40,700	11.8	**
Home Improvements							
8	Promote Home Energy Rating Systems and Energy Efficient Mortgages	\$12					
9	Expand "Cool Communities" Program in Cities and Federal Facilities	\$12	\$11,700	\$5,400	\$21,600	4.4	*
10	Upgrade Residential Building Standards	\$87					
11	Create Energy Efficiency Programs and Housing Technology Centers	\$93					
	Residential Demand Combined Results	\$397	\$31,200	\$14,900	\$62,300	16.3	

For Post-2000 Emission Reduction Potential, (*) reflects static or moderately increasing outyear reductions relative to the projected year 2000 emissions reduction. (**) reflects a 50% or greater increase in projected annual emission reduction over the 2000 level, and (***) reflects increases in projected reductions of more than 200%.

Sources: The greenhouse gas emissions estimates for 1990 are taken from "Emissions of Greenhouse Gases in the United States, 1985-1990" (EIA, 1993) and "Anthropogenic Methane Emissions in the United States, Estimates for 1990" (EPA, 1993). Nitrous Oxide emissions from agriculture were provided by the U.S. Dept. of Agriculture. Interpolations and projections are based on analyses conducted by DOE, EPA and the Dept. of Agriculture for the Climate Change Action Plan. Baseline estimates of emissions may change as internationally-recognized greenhouse gas accounting methodologies evolve.

Note: Combined GHG reductions might not equal the sum of the individual actions due to synergistic effects.

SUMMARY TABLE OF ACTIONS

Action #	Title	Federal Obligation FY1994-2000 In \$millions	undiscounted 1991\$ (Millions)			GHG Reductions in 2000 (MMTCE)	Post-2000 Emission Reduction Potential
			Private Capital Investment 1994-2000	Cumulative Value of Energy Savings: 1994 - 2000	Cumulative Value of Energy Savings: 2001 - 2010		
ENERGY SUPPLY							
Enhanced Natural Gas Utilization							
23	Increase Natural Gas Share of Energy Use through Federal Regulatory Reform	\$0	\$0	\$1,900	(\$260)	2.2	
24	Promote Seasonal Gas Use for the Control of Nitrogen Oxides	\$0	(\$930)	(\$460)	(\$940)	2.8	*
25	Commercialize High-Efficiency Gas Technologies	\$62	\$140	\$70	\$630	0.6	***
Enhanced Renewable Commercialization							
26	Form Renewable Energy Market Mobilization Collaborative and Technology Demonstrations	\$432	\$50	\$280	\$1,100	0.8	***
27	Promote Integrated Resource Planning	\$39	n/a	\$1,500	\$4,300	1.4	
28	Improve Performance of Existing Zero Emissions Tech. Retain and Improve Hydroelectric Generation at Existing Dams	Leasing (\$480)	\$1,500	\$550	\$2,500	2.0	
29	Accelerate the Development of Efficiency Standards for Electric Transformers	\$0	\$480	\$280	\$600	0.8	*
30	Launch EPA's "Energy Star Transformers"	\$4					
31	Reduce Electric Generation Losses Through Transmission Pricing Reform	\$0	(\$5)	\$270	\$1,040	0.8	
	Energy Supply Combined Results	\$57	\$1,235	\$4,390	\$9,970	10.8	
METHANE REDUCTION AND RECOVERY ACTIONS							
32	Expand "Natural Gas Star"	\$6	\$60	\$100	\$110	3.0	*
33	Increase Stringency of Landfill Rules	\$0	n/a	n/a	n/a	4.2	*
34	Expand Landfill Outreach Program	\$6	\$180	\$140	\$270	1.1	*
35	Launch Coalbed Methane Outreach Program	\$8	\$90	\$90	\$160	2.2	**
36	Expand RD&D for Methane Recovery from Coal Mining	\$17	\$200	\$120	\$810	1.5	***
37	Expand RD&D for Methane Recovery from Landfills	\$9	\$200	\$80	\$420	1.0	***
38	Expand AgStar Partnership Program with Livestock Producers	\$19	\$140	\$120	\$180	1.5	*
39	Improve Ruminant Productivity and Product Marketing	\$28	n/a	n/a	n/a	1.8	*
	Methane Reduction and Recovery Combined Results	\$93	\$960	\$650	\$1,950	16.3	

For Post-2000 Emission Reduction Potential, (*) reflects static or moderately increasing outyear reductions relative to the projected year 2000 emissions reduction. (**) reflects a 50% or greater increase in projected annual emission reduction over the 2000 level, and (***) reflects increases in projected reductions of more than 200%.

Note: Combined GHG reductions might not equal the sum of the individual actions due to synergistic effects.

SUMMARY TABLE OF ACTIONS

Action #	Title	Federal Obligation FY1994-2000 In \$millions	undiscounted 1991\$ (Millions)			GHG Reductions in 2000 (MMTCE)	Post-2000 Emission Reduction Potential
			Private Capital Investment 1994-2000	Cumulative Value of Energy Savings: 1994 - 2000	Cumulative Value of Energy Savings: 2001 - 2010		
HFC, PFC and NITROUS OXIDE REDUCTION ACTIONS							
40	Narrow Use of High GWP Chemicals Using the Clean Air Act and Production Stewardship to Reduce Emissions	\$9	n/a	n/a	n/a	5.0	*
41	Create Partnerships with Manufacturers of HFC-22 to Eliminate HCFC-23 Emissions	\$13	n/a	n/a	n/a	5.0	***
42	Launch Partnership with Aluminum Producers to Reduce Emissions from Manufacturing Processes	\$3	n/a	n/a	n/a	1.8	*
17	Improve Efficiency of Fertilizer Nitrogen Use		See Action # 17			4.5	*
	HFC, PFC and Nitrous Oxide Combined Results	\$26	n/a	n/a	n/a	16.3	

FORESTRY ACTIONS							
43	Reduce the Depletion of Nonindustrial Private Forests	\$4	\$0	n/a	n/a	4.0	
44	Accelerate Tree Planting in Nonindustrial Private Forests	\$71	\$40	n/a	n/a	0.5	***
16	Accelerate Source Reduction, Pollution Prevention, and Recycling		see Action # 16			5.0	*
9	Expand "Cool Communities" Program in Cities and Federal Facilities		see Action # 9			0.5	*
	Forestry Combined Results	\$75	\$40	n/a	n/a	10.0	

For Post-2000 Emission Reduction Potential, (*) reflects static or moderately increasing outyear reductions relative to the projected year 2000 emissions reduction. (**) reflects a 50% or greater increase in projected annual emission reduction over the 2000 level, and (***) reflects increases in projected reductions of more than 200%.

Total for Energy Sectors		(\$987)	\$59,985	\$60,570	\$205,030	66.0	
Total for Non-Energy Sectors		\$194	\$900	\$650	\$1,950	42.6	
GRAND TOTAL		(\$793)	\$60,885	\$61,220	\$206,980	108.6	

gap=106.2

Note: Combined GHG reductions might not equal the sum of the individual actions due to synergistic effects.

Notes on Individual Actions

Action 18: The private investment is listed as "n/a" because there are no private capital investments anticipated for this action.

Actions 19, 20 and 21: The private investment is listed as "n/a" because these three actions will result in behavioral changes that affect private investment in ways that cannot be estimated.

Action 23: This action yields energy savings in the near term (through 2000) because it displaces higher cost end-use fuels. However, energy costs are expected to be higher than the base case (without the action) in the longer term (2001-2010), reflecting the price premium of natural gas relative to coal and the longer-run impact of higher gas use on gas prices.

Action 24: This action does not save money on energy costs, but rather is expected to increase utility energy expenditures, reflecting the price premium of natural gas relative to coal and the longer-run impact of higher gas use on gas prices.

Action 27: This action is expected to reduce private investment requirements because utilities will substitute investment in end-use equipment for investment in more capital-intensive generating equipment. However, n/a is listed because detailed estimates could not be derived.

Action 31: This action reduces private capital investment requirements because it decreases the need for transmission capacity.

Action 33: Private investments will likely be made by medium to large landfills, as the Final rule is expected to include an exemption for smaller landfills. Cost estimates and value of energy for these actions will be available at final promulgation of the rule.

Actions 34 and 37: The numbers listed in the energy savings columns for these two actions represent revenues from the sale of the energy produced from landfill gas.

Actions 35 and 36: The numbers listed in the energy savings columns for these two actions represent revenues from the sale of natural gas and electricity.

Action 39: Private investment is anticipated to be negligible. No energy market impact is projected, so no energy savings were calculated.

Action 40: The private costs of this program have not yet been estimated, but they are expected to be low principally because restrictions will only occur in cases where other alternatives are available. No energy market impact is projected, so no energy savings were calculated.

Action 41: Precise estimates of private investment are not yet available, though the Partnership effort will be designed to achieve the highest cost-effective emissions reductions at the lowest cost to manufacturers. No energy market impact is projected, so no energy savings were calculated.

Action 42: No precise estimates of private investment or energy savings are available for this action. The net cost of the action is expected to be close to zero, as any investment in new technology will be offset by energy savings from improvements in energy efficiency.

Actions 43 and 44: Energy savings calculations are not relevant because the forestry actions operate through carbon uptake by trees.

FOUNDATION ACTIONS

Launch the *Climate Challenge*

DESCRIPTION: This action would encourage electric utilities and other eligible firms to submit voluntary greenhouse gas reduction portfolios to the Department of Energy for inclusion in the Energy Information Administration database. This action strengthens the performance of every option targeted at the electric power sector. Electric utilities will signal their intent to work with the Secretary of Energy to voluntarily limit their greenhouse gas emissions using the flexible array of options allowed under the Energy Policy Act - which include:

- Improvements from energy efficiency measures in supply, demand and transmission of electricity.
- Switching to lower carbon fuels (natural gas, hydropower, nuclear and renewable energy projects).
- Forestry.
- Methane capture.
- More efficient appliances and automobiles.
- International projects.

IMPLEMENTATION: The *Climate Challenge* has already attracted over 50 electric utilities, whose Chief Executive Officers have sent letters to the Secretary of Energy stating their intent to either stabilize their greenhouse emissions at or below their 1990 levels or to reduce their emissions to a different measurable performance level not yet established. The Department of Energy and the Climate Challenge members will develop formal agreements that spell out the extent of the individual member commitments. Actions taken to meet these commitments will be reported to the database for recording voluntary emissions reductions being established by the Department of Energy's Energy Information Administration as directed by Section 1605(b) of the Energy Policy Act. That database is expected to be operational by the summer of 1994.

MARKET IMPACT: This action recognizes that government alone cannot identify every cost-effective option. The *Climate Challenge* permits utilities and other volunteers to register the most cost-effective greenhouse gas reductions they can discover, including joint implementation projects, electro-technologies, and other measures. To that end, it helps increase the cost-effectiveness of the plan.

EMISSIONS REDUCTION: The reductions attributable to the *Climate Challenge* will depend on the number of utilities involved and the extent of their commitments. Discussions are still underway with additional companies. To date, utilities representing well over half of the nation's carbon-based generation capacity have provided written notice of their intent to participate in this program.

Launch *Climate-Wise Companies*

DESCRIPTION: EPA and DOE will create *Climate-Wise Companies*, a partnership program to encourage U.S. industry to take advantage of the environmental and economic benefits associated with energy efficiency improvements and greenhouse gas emission reductions. Through this program, EPA and DOE will work with industry representatives, and other eligible participants, to set and achieve meaningful greenhouse gas emission reduction goals. Participants will track their greenhouse gas emissions cuts through a voluntary reporting mechanism established by the Energy Policy Act (EPAct), Section 1605 (b). Those organizations which meet *Climate-Wise* goals will be recognized with a seal of responsible environmental stewardship. By establishing meaningful and credible performance goals, providing technical assistance, and publicly recognizing significant voluntary achievements, the Federal government will serve as a catalyst for environmental action and innovation.

Climate-Wise Companies will serve as an umbrella for other energy-efficiency partnership programs and utility demand-side management programs that target specific areas such as lighting or motors, and help track industrial greenhouse gas emission reductions. *Climate-Wise* will recognize company-wide emission reductions, including those gained through technology advances, behavioral and process changes, and mission reductions from non-energy related activities such as raw materials substitutions and carbon sequestration. Participation in the program is open to all sectors of the economy.

IMPLEMENTATION: The design and development of the *Climate-Wise Companies* program will reflect broad public input. Program benefits will be evaluated annually through external peer review. The voluntary emission reduction reporting database established under Section 1605 (b) of EPAct provides the mechanism for tracking emission reductions. For FY1994, the planning and outreach phase, the Agencies will do the following:

- Develop information and technical assistance materials for a range of target audiences.
- Conduct information meetings via State/DOE/EPA partnerships and outreach to trade association meetings, conferences, workshops, and other events.
- Specify greenhouse gas reduction goals for participants.

The Administration is proposing to obligate \$9 million in FY1995 for this program and \$62 million through 2000.

Active solicitation and recognition efforts to begin in FY1995. The Federal budget is estimated to be \$56 million over FY1994 through FY2000 for this program.

COMMERCIAL ENERGY EFFICIENCY ACTIONS

Coordinate *DOE Rebuild America* and *EPA Energy Star Buildings*

DESCRIPTION: The Environmental Protection Agency and the Department of Energy will coordinate the EPA Energy Star Buildings program and the new DOE Rebuild America program. Working in concert, EPA and DOE will provide the product development, marketing and technical assistance necessary for comprehensive commercial building upgrades.

Commercial buildings are complex, dynamic systems made up of numerous components and subsystems. Many past programs have used a fragmented strategy targeted at individual end-uses or technologies and have ignored interactions between systems. EPA and DOE program strategies reflect a comprehensive, whole-building approach to reduce energy use.

IMPLEMENTATION: Energy Star Buildings is already under development by EPA with the help of a number of Green Lights partners. Companies signing agreements with EPA to join the Energy Star Buildings program will:

- Survey all their domestic facilities.
- Upgrade their heating, ventilation and air conditioning systems where profitable.
- Complete their upgrades within 7 years.

Rebuild America is a new DOE initiative that incorporates extensive demonstrations, training, education, performance monitoring and cost-shared energy audits. The program will bring to the marketplace expertise developed in DOE advanced commercial buildings and existing buildings efficiency research programs.

The agencies will plan and coordinate the programs and develop initial materials in FY 1994, and launch a full, coordinated program in FY 1995, and has allocated funds for their rapid growth. Highlights of DOE/EPA program implementation:

- Energy Star Buildings: EPA will use marketing and program implementation resources developed for the Green Lights and the Energy Star Buildings Programs to expand participation. EPA will also expand "Ally" programs that coordinate the involvement of manufacturers, utilities, distributors, surveyors, and energy service companies.
- Rebuild America: DOE will utilize the 10 regional building efficiency centers established under the Energy Policy Act of 1992. The centers will work with States and regional participants. The centers will also train building owners and managers, and monitor retrofit performance.

The Administration is proposing to obligate \$27 million in FY 1995 for this action and \$190 million through 2000.

MARKET IMPACT: This action will stimulate about \$6.3 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth about \$2.8 billion through 2000, and continues to pay off over the next decade, for an additional savings worth about \$12 billion over the period 2001-2010 (undiscounted 1991 dollars). The programs will help companies reduce their overhead and become more efficient, and will stimulate the introduction of more advanced commercial technologies.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 3.1 MMT of carbon equivalent.

Expand EPA's *Green Lights* Program

DESCRIPTION: The Climate Change Action Plan is providing resources to EPA for several new or significantly expanded *Green Lights* initiatives designed to capture hard-to-reach portions of the commercial lighting market and generally increase the availability of energy-efficient lighting products. EPA *Green Lights* was launched in January 1991, and currently has over 1,100 participants. Current participants include 5% of all commercial space in the United States, and are averaging 65% savings on their lighting and a 20-40% internal rate of return on their investments. The expanded Green Lights effort will include:

- Efforts to increase participation by universities and health-care facilities.
- Special marketing and implementation support for small companies.
- A "super-Ally" program for unprecedented EPA/utility cooperation.
- An "Assist" organization effort that will establish ties between EPA and regional groups to market energy-efficient lighting.
- Increased technical support.

IMPLEMENTATION: All *Green Lights* participants ("Partners") sign a Memorandum of Understanding (MOU) with EPA. Partners agree to (1) survey all their domestic facilities, (2) upgrade their lighting where profitable and (3) complete their lighting upgrades within 5 years. EPA supports its Partners with a package of tools designed to ensure that lighting upgrades will result in the greatest possible energy savings and the highest possible return on investment. A team of lighting experts provides *Green Lights* Partners with technical support and problem-solving advice through a technical hotline, comprehensive manual, regional training workshops, up-to-date literature and on-site implementation visits. Additionally, the *Green Lights* "Allies" programs for lighting manufacturers, lighting management companies, distributors and electric utilities extends the *Green Lights* partnership by enlisting the support of the lighting and power industries.

In the coming months the new *Green Lights* program will launch several initiatives, including an Energy Star Region in the Washington/Baltimore area, which will be the EPA Energy Star Program's first effort to increase participation throughout all market sectors within one geographic region. It also includes a Living Landmarks program to increase the visibility of *Green Lights* by signing up famous sites such as the Old North Church in Boston.

The Administration is proposing to obligate \$ 14 million in FY 1995 for this action and \$98 million through 2000.

MARKET IMPACT: This action stimulates about \$3.3 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth about \$2 billion through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$8 billion over the period 2001-2010 (undiscounted 1991 dollars). Efficient lighting systems reduce energy costs by up to 65 percent. The *Green Lights*, as expanded by this action, will promote the installation of efficient lighting in 16 billion square feet of commercial and industrial space at a cost of \$.50 to \$2.00 per square foot. The program lowers overhead costs for participants, and stimulates the market for new, energy-efficient lighting products.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 2.5 MMT of carbon equivalent.

Establish State Revolving Fund for Public Buildings

DESCRIPTION: The Department of Energy will provide States with \$10 million per year in seed money for five years to design and implement energy management programs for State and local public buildings. The program expands upon a requirement of Section 141 of Energy Policy Act of 1992, which authorizes DOE to establish a State Buildings Energy Incentive Fund to encourage improved energy management.

State and local government facilities represent an attractive target of opportunity for highly cost effective energy savings. The investment can be highly leveraged since the Federal capitalization grants would be loaned, repaid out of savings from decreased energy usage, and loaned out again. State and local government leadership may also stimulate private sector investments in energy efficiency.

IMPLEMENTATION: Several States have already established revolving funds for energy management projects for existing buildings. Under the Clinton Administration, DOE has been developing rules and guidelines governing the use of funds for a nationwide program. DOE will do the following in FY 1995:

- Gather information from States that have recently initiated revolving funds for efficiency improvements in state and local buildings.
- Develop technical information to aid States in evaluating energy efficient retrofit opportunities.
- Work with States to develop methods and criteria for selection of 10 states for initial funding.

From FY 1995-2000 DOE will:

- Select 10 new states each year to receive funding to initiate a revolving fund.
- Distribute information to states implementing the funds.
- Develop a formal DOE evaluation process to assess the performance of the national revolving fund program. The data will be used both to interest States in raising their commitment to the program and to provide quality information on the performance of energy efficient retrofit technologies.

The Administration is proposing to obligate \$11 million in FY 1995 for this action and \$55 million through 2000.

MARKET IMPACT: This action stimulates \$2.5 billion in non-Federal investment for the period 1994-2000 (undiscounted 1991 dollars). The investors for this revolving fund action will be State and local governments. This investment yields energy savings worth close to \$1 billion through 2000, and continues to pay off over the next decade, for additional savings worth about \$4.4 billion over the period 1994-2000 (undiscounted 1991 dollars). DOE projects that 10% of State and local buildings will be affected by 2000, with a 30% average reduction in total energy use for all upgraded buildings.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.1 MMT of carbon equivalent.

Expand Cost-Shared Demonstrations of Emerging Technologies

DESCRIPTION: The Department of Energy will promote the field validation of state of the art emerging energy efficiency and renewables technologies in commercial buildings through a series of cost-shared demonstrations. Demonstrated technologies will include fuel cell applications for on-site power generation, advanced windows including electrochromic technologies, advanced building monitoring/control systems, and active and passive solar technologies. These demonstrations will be full-scale applications of new technologies or practices in Federal, State and local government or private buildings. On the customer side, this initiative will help to overcome the lack of confidence in emerging energy efficiency and renewable energy technologies that is a major barrier to these technologies' acceptance into the market place. On the manufacturers' side, field experience with emerging technologies and practices increases familiarity, lowers perceived risk and accelerates commercialization.

IMPLEMENTATION: DOE is soliciting proposals to demonstrate technologies that are nearly commercial. Proposals will be evaluated on the basis of technical merit, level of co-funding by manufacturers and host agencies, State and local government involvement, and proposed information dissemination. Program activities for FY 1994 include:

- Identification of emerging energy technologies meeting the needs of specific industries and regions; and complementary non-hardware innovations for co-demonstration (e.g., innovative financing arrangements).
- Solicitations of proposals from private- or public-sector organizations who would act either as hosts or contributors for the demonstration.

Demonstrations involve the following activities:

- Installation of the new technologies with significant cost sharing from the host organizations and other partners.
- Monitoring and evaluation of the performance of the technologies.
- Facilitation of first-hand observation of the demonstration by potential investors, users, and manufacturers.
- Dissemination of evaluation results through the partners, industry associations, State governments and the DOE field network.

The Administration is proposing to obligate \$10 million in FY 1995 for this action and \$60 million through 2000.

MARKET IMPACT: Market deployment and innovation will accelerate due to the cost-shared demonstration and R&D. This action, together with the other action to establish energy efficiency and renewable energy information and training programs (see table), stimulates about \$8.4 billion in non-Federal investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth close to \$2.9 billion through 2000, and continues to pay off over the next decade, for additional savings worth close to \$12.3 billion over the period 1994-2000 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the actions to establish energy efficiency and renewable energy information and training programs. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 3.8 MMT of carbon equivalent.

Establish Energy Efficiency and Renewable Energy Information and Training Programs

DESCRIPTION: DOE will launch a comprehensive national initiative to provide the building industry with information and training on energy efficiency and renewable energy options. The initiative will help facility managers, homeowners, architects, engineers, designers, builders, code officials, business managers, and the financial community realize energy and cost savings. This program builds on the activities of the regional building efficiency centers being established under the Energy Policy Act of 1992, and on elements of DOE's advanced commercial building program.

IMPLEMENTATION: DOE will leverage the program by working with a variety of groups, such as the National Advertising Council, industry associations, State energy offices, technology manufacturers, public interest groups, and the State Energy Conservation Program (SECP), which provides grants to States that can be used to fund education and training. Under this broad-based education initiative DOE will:

- Develop a strategy in 1994 to provide information to key players in the commercial building sector at the national and State level.
- Identify related information activities both within and outside the Federal government and potential co-sponsors for the program.
- Develop training and informational materials customized for each targeted group and make them available through the regional building efficiency centers.
- Initiate a series of design competitions to promote use of energy efficient design practices and technologies.
- Work with industry representatives to design a certification process to encourage facilities managers to adopt efficient building operation and maintenance practices.
- Establish a project on savings available through improved commissioning practices.

The Administration is proposing to obligate \$7 million in FY 1995 for this action and \$42 million through 2000.

MARKET IMPACT: This action, together with the other action to expand cost-shared demonstrations of emerging technologies (see table), stimulates about \$8.4 billion in non-Federal investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth about \$2.9 billion through 2000, and continues to pay off over the next decade, for additional savings worth close to \$12.3 billion over the period 1994-2000 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to expand cost-shared demonstrations of energy technologies. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 3.8 MMT of carbon equivalent.

RESIDENTIAL ENERGY EFFICIENCY ACTIONS

Form "Golden Carrot" Market-Pull Partnerships

DESCRIPTION: In the first *Golden Carrot* program, utilities, non-profits, and EPA formed the Super Efficient Refrigerator Program to commercialize a refrigerator that was 50 percent more energy efficient than 1990 models. The program used pooled utility rebates, which together have more impact on appliance manufacturers than individual, uncoordinated rebates. Under the program, 24 utilities pooled \$30 million in potential rebates and held a contest. The manufacturer who bid the fastest delivery of the most efficient refrigerator at the lowest cost received guaranteed rebates from the pool to defray the incremental cost of the efficiency improvement, making the refrigerator as inexpensive to consumers as less efficient models. Thus, consumers buy a more environmentally sound and cheaper-to-operate refrigerator.

DOE and EPA will help launch new partnerships with key market players — utilities, manufacturers, dealers, environmental groups, and public agencies -- to commercialize additional advanced technologies. These initiatives will be designed and implemented through the non-profit Consortium for Energy Efficiency (CEE), which was created during the first *Golden Carrot* program. Key program elements include:

- Establishing coordinated utility DSM programs to create large markets for new technologies.
- Creating "winner-take-all" contests for new technology introduction.
- Working with other government agencies to influence agency or Federally-assisted procurements.
- Coordinating utility retrofit programs with Federal efforts to improve energy efficiency mortgages (EEMs) and home energy rating systems (HERs).

IMPLEMENTATION: Authority is provided in the Energy Policy Act 1992, Title I, Sections 127, 128. EPA, DOE and members of CEE are actively discussing several targets for *Golden Carrot* initiatives in FY 1994. These include clothes washers, residential lighting, advanced heat pumps and central air conditioners. Under the Action Plan, DOE will use its FY 1994 study on advanced technologies (Energy Policy Act, Section 127) to update and expand these assessments, and assist *Golden Carrot* program design and marketing. The Administration is proposing to obligate \$24 million in FY 1995 for this action and \$193 million through 2000.

MARKET IMPACT: This action, together with the action to enhance residential appliance standards (see table), stimulates close to \$19.5 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth about \$9.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth about \$40.7 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to enhance residential appliance standards. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 1 1.8 MMT of carbon equivalent.

Enhance Residential Appliance Standards

DESCRIPTION: The Department of Energy will promulgate revised energy-efficiency standards for eleven residential appliance categories where more stringent standards are technologically feasible and economically justified, and revise them periodically. This action builds on the *Golden Carrot* initiative to improve the energy efficiency of residential technologies. In general, the *Golden Carrot* program brings more advanced designs to market, while appliance standards ensure that all products maintain a minimum level of energy efficiency. Upcoming appliance standards will consider the environmental effects of carbon dioxide emissions and will be more aggressive than previous standards.

IMPLEMENTATION: Authority is provided by the Energy Policy and Conservation Act (Public Law 94-163), as amended by the National Appliance Energy Conservation Act, and the Energy Policy Act of 1992. Federal costs are negligible.

DOE has two pending rulemakings that affect carbon emissions in 2000. The first is a notice of proposed rulemaking (NOPR) for new appliance standards that DOE will issue within the next few months. It will cover eight products: room air conditioners, water heaters, direct heating equipment, mobile home furnaces, kitchen ranges and ovens, pool heaters, television sets, and fluorescent lamp ballasts. After receiving and reviewing comments on its proposed rules, DOE will determine which amended standards should be issued. Standards become effective three years after promulgation, in 1997 or 1998. Incremental Federal costs for this action are negligible.

DOE will also issue an advanced notice of public rulemaking (ANOPR) for revised standards for three products: central air conditioners, furnaces, and refrigerators. After receiving comments, reflecting them in a NOPR, and receiving comments on the NOPR, DOE will issue updated standards that become effective three years after promulgation, in 1998 or 1999.

MARKET IMPACT: This action, together with the action to form *Golden Carrot* market pull partnerships, stimulates close to \$19.5 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth about \$9.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth about \$40.7 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to form *Golden Carrot* market pull partnerships. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 11.8 MMT of carbon equivalent.

Promote Home Energy Rating Systems and Energy-Efficient Mortgages

DESCRIPTION: The Department of Energy, the Department of Housing and Urban Development, the Department of Veterans Affairs, the Farmers Home Administration and the secondary mortgage institutions together will lead a national effort to promote Home Energy Ratings Systems (HERS), and Energy Efficient Mortgages (EEMs). HERS estimate the annual energy use of a building, while EEMs promote the affordability of energy efficient housing. These Agencies will launch education, training, and publicity campaigns in five HUD pilot states. Federal agencies will bring together the other stakeholders - the building, financing, environmental, and consumer communities — to develop teams to promote EEMs in these pilot states. Under the initiative, realtors, appraisers, and lenders will be offered training programs; special recognition will be given to those who offer these additional customer services; publicity campaigns will encourage home sellers to offer -- and home buyers to demand - these energy efficient homes. Under the Action Plan the affected agencies will develop guidelines for reporting HERS and EEMs experiences. The agencies will monitor the programs and provide case studies on the most innovative and successful efforts.

IMPLEMENTATION: DOE will act based upon the authority provided in the Energy Policy Act of 1992 (EPAct) Title I, Sec.102, Residential Energy Efficiency Rating Guidelines, and Title I, Secs. 105 and 106, Energy Efficient Mortgages and Energy Efficient Mortgages Pilot Program. The Veterans Home Loan Program Amendments of 1992 and the Affordable Housing Act of 1990 also contain relevant provisions. DOE will spearhead the effort to coordinate various Federal programs and ensure that EEM programs reach the intended audience. The Administration is proposing to obligate \$2 million in FY 1995 for this action and \$12 million through 2000.

MARKET IMPACT: By 2000 HERS will provide a national system available to anyone seeking reliable information on the energy performance of their home. Under the Action Plan, EEMs are projected to penetrate 20% of the home mortgage market by 2000. This action, together with the other Home Improvements initiatives (see table), stimulates about \$11.7 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). The Home Improvements investment yields energy savings worth about \$5.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$21.6 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the other Home Improvements initiatives. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 4.4 MMT of carbon equivalent.

Expand Cool Communities Program in Cities and Federal Facilities

DESCRIPTION: DOE will mobilize community and corporate resources to strategically plant trees and lighten surfaces on buildings, to reduce air conditioning energy use. Strategic tree planting to shade residential and commercial buildings can reduce energy use and yield cost savings of 10-50%, when combined with lightening building surface colors (especially on roofs) to reduce absorption of sunlight. This initiative expands the existing public/private *Cool Communities* pilot program, founded by EPA and American Forests in 1991, to 250 cities and communities, and to 100 DOD bases and other federal facilities over a ten-year period. DOE and its partners will achieve this expansion nationally through a concerted technical assistance and education effort. *Cool Communities* will organize cooperation among city planners, developers, utilities, community organizations, and Federal facilities managers. Also, the Federal Government is committed to building 20% of new Federal facilities using *Cool Communities* concepts. Utilities will be encouraged to adopt this approach as a demand-side management strategy to enhance the quality of the urban environment, reduce energy demand, and directly sequester carbon.

IMPLEMENTATION: DOE will solicit partnership agreements with interested parties. Currently, American Forests, DOE's Lawrence Berkeley Laboratories (LBL), DOD, and USDA-Forest Service are involved. In the first 6 months of the program, DOE will hold one training seminar and enroll one additional Air Force base and two new Navy and Army bases as Cool Federal Facilities. DOE will enroll an average of 25 cities per year and 10 federal facilities per year over a ten year period, and hold five regional training seminars. In each enrolled city DOE will sign participation agreements with three corporations and one utility, who will serve as sponsors. The Administration is proposing to obligate \$2 million in FY 1995 for this action and \$12 million through 2000.

MARKET IMPACT: The cost of the urban tree planting component of *Cool Communities* is based on average tree planting costs of \$48-137/aree, plus 50-year maintenance costs of \$15-183/aree. Tree planting in this action assumes strategic residential tree plantings shading air-conditioned houses and buildings, of which 25% shade low-income houses. Light colored roofs and pavements may add 5-10% to the cost of routine maintenance and new construction. This action, together with the other Home Improvements initiatives (see table), stimulates about \$1.7 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). The Home Improvements investment yields energy savings worth about \$5.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$21.6 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact due to energy savings from this action was analyzed in combination with the other Home Improvements initiatives. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 4.4 MMT of carbon equivalent. Trees planted for *Cool Communities* also sequester carbon by absorbing carbon dioxide from the atmosphere during growth and photosynthesis, so the program increases carbon uptake by 0.5 MMT of carbon equivalent by 2000.

Upgrade Residential Building Standards

DESCRIPTION: DOE will actively assist States in upgrading energy-related provisions of their residential building standards. The Energy Policy Act (EPAct) requires States to examine the feasibility of upgrading their residential building standards to meet or exceed the Model Energy Code (MEC) of the Council of American Building Officials (CABO). States are required to report the results of this feasibility study to the Secretary of Energy by October 24, 1994.

DOE assistance to states will include:

- Providing information to State officials to promote the benefits of building performance to new home buyers.
- Offering training programs for code officials and home builders.
- Preparing model legislation.
- Testifying before State legislative and administrative bodies.
- Providing grants to States with exemplary programs.

IMPLEMENTATION: DOE will implement this program under the authority of Section 101 of EPAct, which requires States to review their residential standards. Under the Clinton Administration, DOE has been preparing guidelines for States to use in reviewing their residential building codes and in reporting the results of this review to the Secretary of Energy. In addition, HUD is promulgating new standards for manufactured housing that reduce energy use by about 25% (authority contained in the Manufactured Home Construction and Safety Standards Act). Section 101 of EPAct also requires that within one year new FHA-insured and other HUD-assisted housing must meet energy efficiency requirements of the Model Energy Code or the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) energy efficiency standard. The Administration is proposing to obligate \$14 million in FY 1995 for this action and \$87 million through 2000, with 80% of the increase going to the States to support expansion of State building code programs.

MARKET IMPACT: This action, together with the other Home Improvements initiatives (see table), stimulates about \$11.7 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). The Home Improvements investment yields energy savings worth about \$5.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$21.6 billion over the period 2001-2010 (undiscounted 1991 dollars). For this initiative the investment will be in energy-efficient and solar residential buildings and materials, including insulation, wood products, masonry materials, and windows, which will lead to more advanced designs and jobs in the manufacturing sector. Since the standards are set at cost-effective levels, these investments will be more than offset by energy savings, lowering overhead and improving productivity and competitiveness in the world marketplace.

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the other Home Improvements initiatives. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 4.4 MMT of carbon equivalent.

Create Residential Energy Efficiency Programs and Housing Technology Centers

DESCRIPTION: DOE will create this program to recognize and reward homebuilders who build new homes that exceed the standards set forth in the Model Energy Code of the Council of American Building Officials (CABO) and/or apply active and passive solar technologies. The action includes the following activities:

- Development of cost-effective design solutions for high efficiency or solar technologies.
- Government/industry education and training programs in targeted States, through exemplary housing centers.
- Cost-shared demonstrations to "showcase" advanced energy efficiency and solar techniques.
- Consumer-led promotion programs that include a recognizable logo to identify homebuilders participating in the program and public service announcements that outline the cost savings and environmental benefits of efficient homes.
- As needed, Federal agencies will assist in overcoming institutional barriers related to standards, appraisal, or financing.

Initially, the action supports four to eight State pilot Housing Technology Centers -- usually at an existing, related facility - which will coordinate the exemplary housing program. Each pilot project will work in cooperation with a local host organization. The action will emphasize the key role of home builders in the adoption of new construction technology and will assist the housing market in providing financial rewards for home builders who demonstrate leadership in providing energy efficient and affordable housing.

IMPLEMENTATION: This program will be initiated by DOE working with the National Association of Home Builders, its research center, and the State Home Builders Associations. In FY 1994, the agencies will focus on efforts to develop analytical tools for assessing the performance and environmental benefits of the most up-to-date equipment, appliances and building measures in new home construction, and on discussions with home builders and their industry allies on program design. The Administration is proposing to obligate \$15 million in FY 1995 for this action and \$93 million through 2000.

MARKET IMPACT: This action, together with the other Home Improvements initiatives (see table), stimulates about \$11.7 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). The Home Improvements investment yields energy savings worth about \$5.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$21.6 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the other Home Improvements initiatives. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 4.4 MMT of carbon equivalent.

INDUSTRIAL ENERGY EFFICIENCY ACTIONS

Create a *Motor Challenge* Program

DESCRIPTION: The Department of Energy will create a *Motor Challenge* program to reduce greenhouse gas emissions through increased market penetration of efficient electrical motor systems (EMS). The *Motor Challenge* will host a Showcase Demonstration competition to select 25 companies who will install energy-efficient motor systems with technical assistance from DOE and EPA. DOE and EPA will showcase the installations of the 25 winners in a nationwide marketing effort to stimulate the adoption of energy-efficient EMS. Companies will achieve increased EMS efficiency through the system integration of a variety of technology and application options including: energy efficient motors, adjustable speed drives, and efficient motor-driven equipment (e.g., pumps, fans, compressors).

IMPLEMENTATION: DOE will launch the initial phase in FY 1994 with 25 pilot Showcase Demonstrations as an extension of a DOE energy-efficient motors program. DOE will issue a notice in the Federal Register announcing the contest. DOE will provide technical assistance and public recognition for the 25 winners. Technical assistance will include the development of tools and protocols to assist in finding efficiency opportunities and validating the energy savings achieved. A National EMS Account will keep track of emissions reductions achieved by companies participating in the *Challenge*. Results of the Showcase Demonstrations will be used to develop the outreach and widespread deployment phase of the program, which begins in FY 1996. The outreach phase will expand the *Motor Challenge* with a partnership program between government and private EMS end users that will emphasize the recognition of individual companies' achievements of excellence in EMS. The Administration is proposing to obligate \$5 million in FY 1995 for this action and \$30 million through 2000.

MARKET IMPACTS: This action stimulates \$4 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). Investment costs are shared by industrial end-users and utility demand-side management programs. This investment yields energy savings worth about \$5.3 billion through 2000, and continues to pay off over the next decade, for an additional savings worth about \$1.7 billion over the period 2001-2010 (undiscounted 1991 dollars). The *Motor Challenge* will accelerate the introduction of advanced efficiency motors, and lower overhead in participating businesses, freeing up resources for other more productive uses.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 8.8 MMT of carbon equivalent.

Establish *Golden Carrot* Programs for Industrial Air Compressors, Pumps, Fans and Drives

DESCRIPTION: DOE will work with business to create industrial *Golden Carrot* programs for air compressors, fans and pumps, as well as other types of industrial process equipment. *Golden Carrots* pool utility rebates or a group of organizations' purchasing power to promote commercialization of advanced efficiency measures. The original *Golden Carrot* -- the Super Efficient Refrigerator Program -- pooled \$30 million in utility rebate money for the manufacturer who could commercialize the most energy-efficient, CFC-free refrigerator. The greatest potential for improved industrial energy efficiency is found in pulp and paper, textiles, chemicals, petrochemical, and food processing industries, which use more than 50% of the process energy consumed by this sector.

IMPLEMENTATION: This initiative will accelerate the commercialization of high efficiency air compressors, pumps, fans and drives through the following activities: DOE-sponsored study that quantifies the potential efficiency gains from advanced high efficiency air compressors, pumps and fans, and identifies other types of process equipment with potential for cost-effective efficiency gains. A joint effort between utilities, industrial firms, the government, energy users, and non-profits to establish common utility specifications and financial incentives to promote the commercialization of advanced high efficiency equipment. This effort will ensure that utilities develop uniform specifications for high efficiency equipment purchases and provide monetary incentives for their use. A utility-led effort to develop contests similar to the first *Golden Carrot* to commercialize advanced technologies. A private sector pooled purchasing project to enable industrial energy users to make large purchases of high efficiency industrial equipment, at a lower price than individual purchases.

No additional authorization is required. The Administration is proposing to obligate \$2 million in FY 1995 for this action and \$14 million through 2000.

MARKET IMPACT: This action, together with the action to accelerate adoption of energy-efficient technologies (see table), stimulates about \$600 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth \$1.3 billion through 2000, and continues to pay off over the next decade, for an additional savings worth \$7.8 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to accelerate adoption of energy-efficient technologies. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 2.9 MMT of carbon equivalent.

Accelerate the Adoption of Energy-Efficient Process Technologies Including the Creation of One-Stop-Shops

DESCRIPTION: DOE and EPA will step up Federal efforts to remove barriers and speed the adoption of energy efficient industrial process technologies, including those that are fossil-fueled and powered by electricity. DOE will create one-stop-shops to disseminate information on clean technologies through State-based information and referral centers. The action also intends to create opportunities for switching from high carbon fuels to lower carbon fuels. The action targets energy intensive process industries such as petroleum refining, chemicals, pulp and paper, primary metals, waste treatment, and food processing. The metals industries, for example, could reduce emissions by using more efficient furnaces or fuel/air controls, while chemicals, pulp and paper, and food processing industries can make gains from efficient product separation or concentration technologies.

IMPLEMENTATION: DOE and EPA will begin initiatives that include:

- Information dissemination, education and training. The one-stop-shops will build on existing networks in organizations such as DOE, DoD, the National Institute of Standards and Technology (NIST) of the Department of Commerce, the Electric Power Research Institute, the Gas Research Institute, and gas and electric utilities. The shops will help businesses gain access to appropriate technology, regulatory and technical information, and financing in a way that provides seamless, transparent support.
- Conducting seminars, workshops and creating certification programs for training and certifying plant engineers, process technicians and energy managers in small and medium sized companies regarding energy efficient technologies and practices.
- Targeted R&D specifically toward reducing technical or economic barriers to commercialization of advanced process technologies.

The Administration is proposing to obligate \$9.5 million in FY 1995 for this action and \$71 million through 2000.

MARKET IMPACT: This action, together with the action to establish *Golden Carrot* programs for industrial air compressors, pumps, fans and drives (see table), stimulates about \$600 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth \$1.3 billion through 2000, and continues to pay off over the next decade, for an additional savings worth \$7.8 billion over the period 2001-2010 (undiscounted 1991 dollars). This initiative will add to the energy efficiency of targeted process technologies by 9 percent by 2000.

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to establish *Golden Carrot* programs for industrial air compressors, pumps, fans and drives. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 2.9 MMT of carbon equivalent.

Expand and Enhance Energy And Diagnostic Centers

DESCRIPTION: DOE will significantly increase the number of Energy and Diagnostic Centers (EADCs) across the U.S., and improve the implementation rates of recommended cost-effective energy efficiency improvements at EADC client facilities. EADCs are university-based programs that offer free energy audits and technical recommendations to small and medium-sized firms by engineering faculty and students who, gain real-world experience in technical evaluation and project implementation. Under an aggressive expansion of the EADC program, the number of audits conducted annually will increase from 700 to more than 2000 per year by the year 2010. DOE will provide a range of implementation support services not now included in the existing EADC program. Additional EADC program enhancements include:

- Links with utility industrial demand-side management DSM programs and State energy conservation program incentives.
- Life-cycle analysis to consider conservation opportunities beyond the typical 2-year payback cutoff.
- Best practice profiles offering annual recognition and awards to model industries.
- Outside process consultants to support consideration of frontier technologies within the EADC process.

IMPLEMENTATION: Under the new initiative, six new EADC centers will be added by FY 1995; some existing programs will be restructured and a best practice program component will be established that is tailored to small and medium six enterprises. This program also includes best practice profiles and the offers of annual recognition awards to model industries. The Administration is proposing to obligate \$3 million in FY 1995 for this action and \$27 million through 2000.

MARKET IMPACT: This action stimulates about \$160 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth close to \$280 million through 2000, and continues to pay off over the next decade, for an additional savings worth about \$960 million over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 0.5 MMT of carbon equivalent.

Accelerate Source Reduction, Pollution Prevention, and Recycling

DESCRIPTION: EPA, USDA and DOE will together promote source reduction, pollution prevention and recycling of paper and other municipal solid waste (MSW) to reduce greenhouse gas emissions. Source reduction and recycling lead to increased carbon sequestration in forests and reduced energy use in extraction and processing of virgin materials. The Action Plan includes:

- Expanded Federal Partnership Programs (EPA):
 - Source Reduction: Encourage the adoption of unit pricing (charging homeowners by the amount of garbage they throw away); provide incentives and education to practice source reduction; promote the design of longer life, repairable goods.
 - Recycling: Foster "buy recycled" programs; expand access to information clearinghouses; increase use of government loan guarantees for recycling manufacture investment; provide technical assistance to State/local governments to improve quality of recycled materials.
- Expand Paper Recycling Technology Research (USDA Forest Service) Priorities include research on recycling solid wood and composites and on recycling paper and paperboard to increase the number of times products can be recycled.
- Expand NICE³ Industrial Pollution Prevention Grants Program (DOE, EPA). The National Industrial Competitiveness through Efficiency, Energy, Environment, and Economics (NICE³) is a joint DOE/EPA program that provides grants to diffuse existing technologies, to prevent pollution, and to improve energy efficiency. This action targets the addition of new processes and/or equipment. This will reduce high-volume wastes in industry, conserve energy and energy-intensive feedstocks, and improve industrial cost-competitiveness.

IMPLEMENTATION: DOE, EPA, and USDA are allocating additional resources to improve current programs. The Administration is proposing to obligate \$11 million in FY 1995 for this action and \$86 million through 2000.

MARKET IMPACT: Increased source reduction and recycling will save energy and money, cut greenhouse gases, reduce the need for natural resource extraction and help alleviate disposal problems. Localities currently spend \$11 billion each year just to dispose of paper. Expansion of the partnership program will stimulate the demand for recycled materials as well as the demand for goods that require less materials in their production, and create badly needed jobs in the recycling sector, primarily in cities. This action stimulates about \$90 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth close to \$5.4 billion through 2000, and continues to pay off over the next decade, for an additional savings worth about \$31 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The energy savings component of this action reduces greenhouse gas emissions from projected 2000 levels by 4.2 MMT of carbon equivalent. The action will also protect carbon sequestered in forests, because fewer trees will be cut to produce paper, reducing greenhouse gas emissions by an additional 5.0 MMT of carbon equivalent.

Improve Efficiency of Fertilizer Nitrogen Use

DESCRIPTION: The USDA will launch a new partnership with American farmers to improve the efficiency of fertilizer use, which will result in lower emissions of nitrous oxide (N₂O) from microbial activity occurring in the soil and lower CO₂ emissions from electricity and natural gas consumption during manufacture of fertilizer. USDA will expand activity to develop models that focus on trace gas exchange related to the bacterial nitrification and denitrification processes. These models will be used to improve nitrogen use efficiency while maintaining an efficient and productive agricultural system. USDA will initiate demonstration projects and prepare an information campaign to insure widespread application of improved management practices. Reductions in nitrogen fertilizer use resulting from this program are expected to be within the 10 - 30% reduction proposed in S.1114 (reauthorization of the Clean Water Act).

IMPLEMENTATION: The new program will build on existing modeling efforts in the USDA-ARS and will be implemented in two phases. The first phase will consist of concurrent research, model development, and demonstration projects, occurring over a three-year period. The second phase will improve application of the information gained in the first phase and outreach to ensure widespread application. Specific FY 1994/1995 activities include: completion of field experiments that would focus on the trace gas exchange involved in the bacterial denitrification processes; development of mathematical models that represent these processes; and using these models to test management options to improve nitrogen use efficiency. In FY 1996/1997 demonstration projects will be initiated and educational information prepared and disseminated to insure widespread application of the improved management practices.

USDA will cooperate with other agencies along the lines, for example of the joint USDA/EPA pollution prevention plan, to initiate partnership programs to encourage better management practices, and utilize USDA personnel for technology transfer at State and local levels. The Administration is proposing to obligate \$3 million in FY 1995 for this action and \$19 million through 2000.

MARKET IMPACT: Research and education will help farmers adopt improved technology that does not significantly decrease productivity or result in a net loss of income. In principle, the fertilizer industry supports the concept of improving nitrogen fertilizer use efficiency. However, they may expect to experience decreased volume of fertilizer sales, but an increased sale of services. Private sector investments will be negligible. This program together with the action to reduce pesticide use will result in energy savings worth about \$1.9 billion through 2000, and an additional savings of about \$9 billion over the period 2001-2010.

EMISSIONS REDUCTION: This action saves energy through decreases in energy-intensive fertilizer production. The energy savings from this action plus the energy savings from the action to reduce pesticide use combine to reduce greenhouse gas emissions from projected 2000 levels by 2.7 MMT of carbon equivalent. This fertilizer action also reduces emissions of nitrous oxide, and so additionally reduces greenhouse gas emissions from projected 2000 levels by 4.5 MMT of carbon equivalent.

Reduce Pesticide Use

DESCRIPTION: The Environmental Protection Agency, the Department of Agriculture, and the Food and Drug Administration have jointly committed to reducing the use and risks posed by pesticides. Through improved cooperation among the three agencies, the research priorities for the Department of Agriculture's programs will be linked to finding replacements for pesticide uses which EPA identifies as posing human health or environmental risks. Public participation will be enlisted in the setting of national use and risk reduction goals.

IMPLEMENTATION: The specific strategies for meeting the Administration's commitment are (1) Improving the regulatory system to ensure the timely elimination of unacceptable risks to human health and the environment; (2) Establishing incentives for the development, registration, and use of biological and reduced risk pesticides; (3) Implementation of demonstration projects in areas and for crops which will result in overall pesticide use reduction; and (4) Achieving specific goals for the adoption of integrated pest management programs which rely on pesticide uses only as a last result. Incremental Federal costs for this action are negligible.

MARKET IMPACT: The pesticide industry may experience a decreased volume of pesticide sales, but an increase in sales of services is likely (e.g., integrated pest management). As the trend away from traditional pesticide use picks up momentum, so too will promotion of the high-technology bioengineering industry. Private sector investments will be negligible. This program together with the action to improve efficiency of fertilizer use will result in energy savings worth \$1.9 billion through 2000, and an additional savings of \$9 billion over the period 2001-2010.

EMISSIONS REDUCTIONS: This action saves energy through decreases in energy intensive fertilizer production. The energy savings from this action, plus the energy savings from the action to improve efficiency of fertilizer use, combine to reduce greenhouse gas emissions from projected 2000 levels by 2.7 MMT of carbon equivalent.

TRANSPORTATION ACTIONS

Reform the Federal Tax Subsidy for Employer-Provided Parking

DESCRIPTION: The Action Plan calls for transforming an existing tax subsidy narrowly targeted at employer-paid parking into a powerful reward for commuters to ride transit, carpool, or find other ways to get to work. Employees given free parking at work will have the option of retaining the parking space, or accepting a cash allowance equal to the market cost of the parking space. The cash reward will be considered taxable income. Those who opt for the parking space will be unaffected by the change. Whether the employee decides to take the free parking or the cash reward, the company can still deduct the cost from corporate income tax. Since the action focuses on employer-paid parking - where firms lease or otherwise directly pay for parking garage space for the exclusive use of their employees - the program will have no impact on rural areas. But urban commuters will now have an opportunity to "cash-out" a fringe benefit, at no cost to their employer.

IMPLEMENTATION: The Administration will shortly propose changes in the tax law necessary to bring about parking subsidy reform, and will work with Congress to ensure speedy passage. The change will require employers who pay for employee parking to offer also the choice of an equivalent cash payment or a tax-free transit pass. The cash-out provision will apply only to parking spaces leased by employers from a third party for which the lease allows a reduction in the number of spaces without penalty. The provision will apply to all parking subject to new lease agreements made after January 1, 1994. Employer-owned parking will be excluded. Parking provided by firms with fewer than 25 employees will be exempt from the program. In light of the tremendous potential of the cash-out option, EPA may consider amending its reporting requirements for Employer Trip Reduction programs required under the Clean Air Act if the cash-out achieves similar results. EPA will ask the national organizations of local planners, real estate developers, environmentalist and transit agencies to work together to recommend revisions to local zoning and parking regulations in response to the change in Federal policy. Finally, this action has been designed to minimize administrative burden for employers while providing a significant benefit to employees. After evaluating the effect of the action, the Administration will also examine the cash-out provision to other parking that employers offer for the exclusive use of employees. This action is expected to increase Federal revenues by approximately \$2.2 billion through 2000.

MARKET IMPACT: Parking subsidy reform will raise the disposable income of employees while reducing the need to construct new parking facilities in urban areas and increasing the use of mass transit, carpool lanes, and other travel alternatives. Parking subsidy reform will alleviate traffic congestions during week-day rush hour, perhaps reducing the need for some new highway expenditures. Finally, the tax code change is projected to increase Federal tax receipts by \$1.3 billion from employees who chose income in preference to parking space. This action, together with the actions to promote telecommuting and adopt a transportation system efficiency strategy, yields energy savings valued at almost \$16 billion through 2000, and an additional \$30 billion over the period 2001-2010 (undiscounted 1991 dollars). This action will result in behavioral changes that affect private investment patterns in ways that cannot be estimated.

EMISSIONS REDUCTION: The emission impact of this action was analyzed in combination with the Transportation System Efficiency Strategy Telecommuting action. Together, these carbon actions reduce greenhouse gas emissions from projected 2000 levels by 6.6 MMT of carbon equivalent.

Adopt A Transportation System Efficiency Strategy

DESCRIPTION: This initiative promotes the adoption by States of measures that dampen the growth in vehicle travel. Such policy tools include a strong transportation conformity rule to ensure that transportation infrastructure spending is consistent with States' clean air plans; credits for emission reductions under the Clean Air Act; Intermodal Surface Transportation Efficiency Act funding; and aggressive Federal outreach. Measures the States will adopt include:

- Market mechanisms to encourage people to drive less.
- Parking charges.
- Emissions-based fees.
- Transit subsidies.

A Travel Model Improvement Program will be developed to sharpen the tools used to analyze such measures, to better inform State and local decision makers and to put demand management and capacity expansion on equal analytic footing.

Along with incentives to reduce vehicle travel, this initiative fosters greater mobility and choice for travelers. The Administration will evaluate the \$1 billion per year Congestion Mitigation and Air Quality (CMAQ) program to ensure that it fosters travel alternatives that contribute to long-run air quality and greenhouse gas reduction goals. *Alternative Transportation Futures* projects – cooperative demonstrations between government and industry - will test the viability of innovative alternatives to driving alone such as telecommuting, small-scale transit, and Intelligent Vehicle-Highway Systems (IVHS) which merge transportation and communication technologies to improve mobility and efficiency.

IMPLEMENTATION: EPA will promulgate the Clean Air Act's Transportation Conformity rule in the Fall of 1993. EPA and DOT will use informational conferences, technical documents and on-line assistance to help State and local transportation and air quality officials adjust infrastructure spending and to involve environmental, business and citizens groups in the process. In 1994, EPA, in consultation with DOT, will issue the first of a series of guidances describing how States can take credit for market-based transportation measures in their clean air plans. The first *Alternative Transportation Futures* projects, focusing on telecommuting, will start within a year. The Administration is proposing to obligate \$12 million in FY 1995 for this action and \$89 million through 2000.

MARKET IMPACT: The Transportation System Efficiency Strategy will broaden the arsenal of strategies available to states seeking to meet the joint challenges of clean air and urban mobility. This initiative will reduce the costs of clean air compliance and improve the quality of life of transportation users through increased choice and enhanced environmental quality. New technologies, such as virtual offices (completely portable communications and computing equipment), telecommuting devices, smart cars and transit vehicles, and advanced traveller information systems will be encouraged. This action, together with the actions to reform the Federal tax subsidy for employer-provided parking and promote telecommuting (see table) yields energy savings worth close to \$16 billion through 2000, and an additional savings worth about \$30 billion over the period 2001-2010 (undiscounted 1991 dollars). This action will result in behavioral changes that affect private investment patterns in ways that cannot be estimated.

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the actions to reform the Federal tax subsidy for employer-provided parking and promote telecommuting. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 6.6 MMT of carbon equivalent.

Promote Greater Use of Telecommuting

DESCRIPTION: EPA and DOT will promote home-based or satellite location telecommuting to reduce commuter travel. A recent study by DOT estimates that home-based telecommuting will increase by as much as five fold by the year 2000. Current trends toward telecommuting are likely to save 1.5 billion gallons of motor fuel and 3.5 million metric tons of carbon equivalent in 2000. The Action Plan will stimulate greater growth through additional incentives for employers and employees. The recently released National Performance Review encourages greater use of telecommuting to make the federal workplace more efficient, and has recommended implementation of telecommuting pilot projects for a number of federal agencies. In conjunction with implementation of telecommuting projects within federal agencies, this action proposes a combination of actions that may lead to modest increases in telecommuting. This initiative directs:

- EPA in consultation with DOT to issue guidance for States to take pro-telecommuting measures, such as:
 - Removing local zoning ordinances that prohibit telecommuting.
 - Giving employers extra credit under trip reduction ordinances.
 - Creating business tax incentives.
 - Implementing telecommuting programs for State and local employees.
- DOT to encourage States to use Intermodal Surface Transportation Efficiency Act (ISTEA) funds to initiate or expand telecommuting programs and assist in establishing local pilot programs.
- DOT to implement a federal telecommuting pilot project with the goal of getting one to two percent of federal employees to work at home at least one day per week.
- DOT in conjunction with other agencies to develop a national "work-at-home" campaign to promote part-time, home-based telecommuting to reduce traffic congestion and promote energy conservation.

IMPLEMENTATION: EPA will issue State Implementation Plan (SIP) guidance in order for States to implement the suggested measures. A federal work-at-home program may require changes in current regulations. It is expected that most Federal costs will be covered with existing programs.

MARKET IMPACT: This action together with the actions to reform the Federal subsidy of employer-provided parking and promote telecommuting yields savings worth close to \$16 billion through 2000, and continues to save energy over the next decade, for an additional savings worth \$30 billion over the period 2001-2010 (undiscounted 1991 dollars). Private capital investments are negligible.

EMISSIONS REDUCTION: This action together with the actions to reform the Federal subsidy of employer-provided parking and promote telecommuting reduce greenhouse gas emissions from projected 2000 levels by 6.6 MMT of carbon equivalent.

Develop Fuel Economy Labels for Tires

DESCRIPTION: DOT will increase vehicle fuel economy by establishing tire labels for the replacement market. These labels will be based on a measure of their impacts on vehicle fuel economy (due to rolling resistance). The labels and the DOT-initiated publicity campaign will encourage both consumers and businesses to purchase - and manufacturers to produce - more fuel efficient tires to respond to the labeling requirements. Efficient tires increase fuel economy by 4 percent over average replacement tires with comparable performance.

IMPLEMENTATION: DOT, through the National Highway Traffic Safety Administration, will adopt test procedures and new DOT rules requiring tire manufacturers to test and label. DOT will also create a consumer-focused publicity program and a monitoring program in order to realize maximum benefits. The Administration is proposing to obligate \$0.3 million in FY 1995 for this action and \$2 million through 2000.

MARKET IMPACT: This program is expected to result in the purchase of about 20 million additional fuel efficient tires (out of a total replacement market of about 120 million units) in the year 2000. These purchases will be made at an average incremental cost of \$20 per tire for cars and light trucks, and \$60 per tire for heavy trucks. The new tires more than pay for themselves through improved fuel economy. This action is expected to displace 30 - 40 million barrels of oil per day in 2000 and 50 - 70 million barrels of oil per day in 2010. This action stimulates \$2.2 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth \$2.7 billion through 2000, and continues to pay off over the next decade, for an additional savings worth \$1.2 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.5 MMT of carbon equivalent.

Energy Supply Actions

Increase Natural Gas Share of Energy Use Through Federal Regulatory Reform

DESCRIPTION: The Administration supports additional efforts by the Federal Energy Regulation Commission (FERC) to expand and improve natural gas markets through regulatory reform. These efforts will include an investigation of current pipeline construction rules, promulgation of incentive ratemaking guidelines and a review of the rules regarding the secondary market for pipeline transportation. The Department of Energy estimates that such FERC actions can result in an additional increase in gas use of .37 Trillion Cubic Feet in the year 2000.

IMPLEMENTATION: The FERC has taken a number of dramatic actions intended to improve competition and service in the natural gas industry. The Administration recognizes the valuable contribution these efforts have made to improving natural gas markets. We also recognize the need to carefully target new policies in order not to jeopardize the progress made to date. Discussions with other agencies and the FERC have demonstrated that there is scope for additional activity that will complement and support the FERC's efforts. To insure that targeted efforts under this element work in concert with the FERC's activities, DOE and the FERC will establish an interagency working group that will meet on an ongoing basis to coordinate policy development and implementation. Incremental Federal costs of this action are negligible.

MARKET IMPACT: There will be minimal net cost to the natural gas industry due to involvement in rulemaking proceedings and rate filings before the FERC. After initial rulemakings and rate filings are completed, industry costs will be reduced from current levels. This is a cost-effective initiative which will produce net economic benefits apart from greenhouse gas reductions. Incentive ratemaking will lead to longer periods between rate cases, while streamlining the pipeline construction process will reduce the time, and therefore costs, of placing new facilities in service. A robust secondary market will improve the efficiency of the gas market by allowing greater latitude on buy-sell transactions. This action yields energy savings worth about \$1.9 billion through 2000 because it displaces higher-cost end-use fuels. However, energy costs are expected to be \$260 million greater over the period 2000-2010, reflecting the price premium of natural gas relative to coal and the impact of higher gas use on gas prices.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 2.2 MMT of carbon equivalent.

Promote Seasonal Gas Use for Control of Nitrogen Oxides (NO₂)

DESCRIPTION: The Administration will aggressively promote the summer use of natural gas in utility coal and oil plants and in industrial facilities as an innovative, low-cost NO₂ reduction strategy. This action, which reduces NO₂ emissions that contribute to smog formation during summer months, also reduces carbon emissions through seasonal substitution toward low-carbon fuel.

The Administration generally encourages the development of incentive-based strategies. EPA's recently proposed Economic Incentive Program (EIP) rules encourage the adoption of incentive-based, innovative programs that help States meet air quality goals through flexible approaches which allow for less costly control strategies and provide stronger incentives for the development and implementation of innovative emission reduction technologies. EPA also recently issued a guidance document describing how States may use seasonal gas strategies to meet NO₂ reasonably available control technology (RACT) requirements.

IMPLEMENTATION: EPA's administrative action is taken under Title I of the Clean Air Act. The action is tied to rules and guidance issued in response to NO₂ RACT requirements, the Economic Incentive Program, and State Implementation Plans related to National Ambient Air Quality Standards attainment under Title I of the Clean Air Act. There is a savings relative to NO₂/ozone control strategies, making this a low- or no-cost CO₂ reduction measure. Incremental Federal costs for this initiative are negligible.

MARKET IMPACT: The emissions reduction estimate assumes that seasonal gas use (and other gas-related and market-oriented actions) coupled with an intra- or inter-utility trading program are adopted in several non-attainment areas, such as the Northeast Transport Region, Atlanta, Houston, and Chicago-Milwaukee, as part of a Clean Air Act compliance strategy. Approximately 5% of utility coal boilers nationwide were assumed to adopt a seasonal gas burn strategy and/or other gas-related compliance actions. Participating facilities will avoid investments in control equipment needed to meet RACT standards without fuel switching. This action reduces the need for investment in expensive pollution control equipment, and so reduces private investment requirements by \$930 million (undiscounted 1991 dollars) for the period 1994 to 2000. Utility energy expenditures are expected to increase by about \$460 million through 2000 (and by about \$940 million over the period 2001-2010, reflecting the price premium of natural gas relative to coal and the impact of higher gas use on gas prices (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 2.8 MMT of carbon equivalent.

Commercialize High Efficiency Gas Technologies

DESCRIPTION: DOE will provide cost sharing for a portion of the cost of demonstrating the effectiveness of high efficiency gas technologies, such as fuel cells, from 1995 to 1997. DOE will provide one third of the rebate funds required to bring fuel cells to market, with the remainder of the funds provided by the private sector. Anticipated payback of this funding will come from royalties on future sales.

DOE will initiate a second round of demonstrations for advanced fuel cells for FY 1995 through FY 1997, which is anticipated to cause market entry of the advanced fuel cells. These demonstrations will help provide confidence for investment in manufacturing facilities, warranties, and customer purchase, and maintain U.S. momentum in international fuel cell competition.

Fuel cells are an ultra-high efficiency and environmentally benign method of producing electricity and by-product thermal energy. This technology is a means of converting the chemical energy of fuel directly into electrical energy without a combustion process.

IMPLEMENTATION: This action stimulates \$140 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth \$70 million through 2000, and continues to pay off over the next decade for an additional savings worth about \$620 million over the period 2001-2010 (undiscounted 1991 dollars). The Administration is proposing to obligate \$18 million in FY 1995 for this action and \$62 million through 2000.

MARKET IMPACT: This action stimulates \$140 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth \$70 million through 2000, and continues to pay off over the next decade for an additional savings worth about \$630 million over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 0.6 MMT of carbon equivalent.

Form Renewable Energy Market Mobilization Collaborative and Technology Demonstrations

DESCRIPTION: The Department of Energy will form a collaborative with private industry to accelerate market acceptance of renewable technologies and to conduct industry cost-shared demonstrations of renewable energy technologies in multiple regions of the U.S. DOE will fund utility/independent power industry consortia to pool purchases of nearly-commercial renewable systems. DOE will also join with these consortia and States in cost-shared demonstrations of larger renewable energy systems.

IMPLEMENTATION: Under the leadership of Secretary O'Leary, DOE is actively establishing such consortia using existing authority. These activities will focus on four key technology areas:

- **Wind:** The Department of Energy/Electric Power Research Institute/Utility consortium phase one solicitation is in final review with responses from more than 20 utilities/industry partners. Funds will be awarded on the basis of competitive solicitations in September 1994 to support the best proposals for cost-shared field validations of commercial prototype wind turbines.
- **Photovoltaics:** Non-profit consortia formed by Edison Electric Institute, American Public Power and National Rural Cooperative consist of 67 utilities. The start-up has been funded and proposals for field demonstrations of new technologies are expected by late 1993.
- **Biomass power:** More than twenty project developer/utility customer/advanced biomass hardware suppliers partnerships have been formed. Feasibility work is in the final stages. Negotiations to proceed with cost-shared demonstration projects will start in early 1994.
- **Geothermal:** A consortium of geothermal developers and utilities has been established for cost-shared development of these technologies. Plans have been initiated to issue a competitive solicitation in early 1994 to cost-share industry drilling and exploration programs to expand the geothermal reserves. DOE will allocate additional funds to construct cost-shared facilities, with wider participation of those companies with a large inventory of undeveloped sites.

The Administration is proposing to obligate \$72 million in FY 1995 for this action and \$432 million through 2000. Additionally, a \$423 million decrease in tax revenues results from increased use of the Renewable Energy Production Incentives tax credit.

MARKET IMPACT: This action stimulates \$50 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment, when coupled with Federal cost-share funds, yields energy savings worth \$280 million through 2000, and continues to pay off over the next decade, for an additional savings worth about \$1.1 billion over the period 2001-2010 (undiscounted 1991 dollars). This effort will increase the production and lower costs of these technologies because of improved economies of scale and will send positive market signals, attracting increased capital to renewable technologies manufacturers.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 0.8 MMT of carbon equivalent.

Promote Integrated Resource Planning

DESCRIPTION: Integrated resource planning (IRP) stresses systematic consideration of all relevant options and uncertainties in the development of a utility's resource plan. Such options include both supply and demand resources such as renewable generating technologies, programs to help customers improve energy efficiency or use alternative fuels, utility investments to improve the efficiency of their generation, transmission and distribution equipment, purchase of electricity from non-power producers, and electricity imports from Canada. To promote IRP, the Action Plan includes:

- Removing barriers to increased use of natural gas and investments in efficiency measures in generation, transmission and distribution of power.
- Actions to make utility investments in energy efficiency and conservation as profitable as supply-side investments.
- Demand side management (DSM) by electric and natural gas utilities.
- Rate design reform.
- Least-cost Clean Air Act compliance.

The expanded IRP program will provide a supportive regulatory foundation for the adoption of energy efficient technologies encouraged by other Commercial, Residential and Industrial Demand actions.

IMPLEMENTATION: DOE will work through its Integrated Resource Planning Program. This action expands the mission and budget of DOE programs that promote IRP, under current authority. DOE's IRP program will coordinate with other Federal agencies in the development and provision of relevant technical and financial assistance to the States.

DOE will revise its current IRP Program Plan over the next 3 to 6 months to encourage utility activities that achieve greenhouse gas emission reductions. In fiscal years 1994 and 1995 DOE will provide technical, training, and financial assistance to State commissions and utilities to facilitate adoption of measures that increase the efficiency of electricity and natural gas production, transmission and use.

The Administration is proposing to obligate \$6 million in FY 1995 for this action and \$39 million through 2000.

MARKET IMPACT: Electricity demand is expected to be reduced by 5 billion kilowatt-hours. This initiative provides more planning flexibility, lowers costs for utilities over the long term and spurs adoption of innovative technologies and approaches. This program, which also leverages other initiatives, supports regulatory practices favored by the recent Energy Policy Act. This action is expected to reduce private investment requirements because utilities will substitute investment in end-use equipment for investment in more capital-intensive generating equipment. However, detailed estimates were not derived. The increased use of IRP yields energy savings worth about \$1.5 billion through 2000, and continues to pay off over the next decade, for additional savings worth about \$4.3 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.4 MMT of carbon equivalent.

Retain and Improve Hydroelectric Generation at Existing Dams

DESCRIPTION: This strategy is a two-fold initiative to remove barriers for the use of environmentally sound hydroelectric generation. The Federal Energy Regulatory Commission (FERC), in conjunction with other interested agencies, can act to remove regulatory barriers to low-impact, non-Federal hydroelectric development at existing dams. At the same time, the Administration will remove regulatory barriers to private funding of generation improvements at existing Federal water facilities. The Department of Energy will review all Federal water facilities to identify opportunities to economically improve hydro generation. The Bureau of Reclamation and the Corps of Engineers will continue to conduct feasibility studies, but instead of asking Congress for appropriations to make generation improvements, they will request private sector bids for the lease of the development rights. This action will result in about 2 GW of new hydroelectric capacity achieved through powerhouse efficiency improvements, without affecting stream flows.

IMPLEMENTATION: The Administration will propose legislation to allow private investment in improvements at Federal water facilities. FERC action is accomplished through improved Commission policies and regulations (18 CFR, Parts 1-399). Administration action is initiated under section 2404 of the Energy Policy Act, which requires the Department of Energy to review Federal water facilities. It will cost approximately \$2 million annually in FY1994 and FY1995 to implement regulatory and policy changes and review all Federal facilities. Reclamation and the Corps will continue to fund feasibility studies at current projected levels of funding.

MARKET IMPACT: Between 1998 and 2000, the Federal government will receive approximately \$480 million in lease payments. The Federal treasury would receive lease payments of approximately \$160 million per year between 1998 and 2000 for a total of \$480 million. Construction and lease costs for the developer would be less than or comparable to other sources of electric power. These costs would be fully recovered by the developer from the sale of the additional electricity generated. This action stimulates \$1.5 billion in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth about \$550 million through 2000, and continues to pay off over the next decade, for an additional savings worth \$2.5 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 2.0 MMT of carbon equivalent.

Accelerate the Development of Efficiency Standards for Electric Transformers

DESCRIPTION: The Department of Energy will accelerate the development of testing requirements and efficiency standards for electric transformers in order to get maximum energy savings by 2000. Under Sec. 124 of the Energy Policy Act of 1992, DOE is charged with developing testing requirements for distribution transformers (by March 1995), and prescribing energy conservation standards for transformers (by September 1996). DOE is expected to complete a study of the potential for cost-effective replacement of utility transformers by March 1994. Based on this timeline, new efficiency standards will most likely take effect in 1998 or 1999.

IMPLEMENTATION: DOE will accelerate the development of these standards, to be effective in 1995 or 1996, using current authority under the Energy Policy Act. Incremental Federal costs for this action will be negligible.

MARKET IMPACT: Utilities will incur some incremental costs associated with purchasing transformers that meet the new standards, but this equipment will be cost-effective for the majority of applications. Utilities now replace a million transformers per year out of a total stock of 40 million transformers. The capital cost differential will decline as the sales volume of the higher-efficiency transformers increases, due to economies of scale in the production process. This action, together with the action to launch EPA *Energy Star Transformers* (see table), stimulates about \$480 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth close to \$280 million through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$600 million over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to launch EPA *Energy Star Transformers*. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 0.8 MMT of carbon equivalent.

Launch EPA Energy Star Transformers

DESCRIPTION: EPA will launch *Energy Star Transformers*, a partnership with electric utilities to invest in amorphous core energy-efficient transformers that reduce transformer losses. EPA will work with industry to establish minimum efficiency levels, where all qualifying equipment will be designated with the Energy Star logo. Participating utilities agree to purchase only Energy Star transformers, and to institute early replacement of transformers where economically warranted. EPA will distribute information regarding energy-efficient transformers to utilities and State Public Utility Commissions (PUCs), and help participating utilities to organize group purchases of energy-efficient transformers in order to obtain lower prices.

IMPLEMENTATION: Implementation is currently underway with industry stakeholder meetings. Manufacturer response has been highly positive. Additional resources will be allocated in 1994 and 1995 to gain greater program participation among utilities through sponsorship of additional program conferences and broad marketing initiatives. This action works in concert with the action to promulgate minimum efficiency standards for transformers, which will remove low efficiency transformers from the marketplace. The Administration is proposing to obligate \$1 million in FY 1995 for this action and \$3.5 million through 2000.

MARKET IMPACT: Participating utilities will incur up-front incremental costs of 25-35% compared to regular transformers. This investment will pay off in approximately seven years and then continue to pay off over the life of the transformer, which is more than 40 years. The cost differential will decline as the sales volumes increases, due to economies of scale in the production process. The costs will be incurred as utilities routinely replace their transformers (i.e., natural turnover), or undertake cost-effective early replacement. Under Energy Star Transformers, 3 million amorphous core transformers will be installed by 2000, with penetration rising from less than 5 percent of total installations in 1995 to nearly 100 percent of total installations in 2000. This action, together with the action to accelerate the development of efficiency standards for electric transformers (see table), stimulates about \$480 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields energy savings worth close to \$280 million through 2000, and continues to pay off over the next decade, for an additional savings worth close to \$600 million over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: The emissions impact of this action was analyzed in combination with the action to accelerate the development of efficiency standards for electric transformers. Together, these actions reduce greenhouse gas emissions from projected 2000 levels by 0.8 MMT of carbon equivalent.

Reduce Electric Generation Losses Through Transmission Pricing Reform

DESCRIPTION: The Administration supports electric transmission pricing reform which reflects the benefits of reverse flows of electricity.

In 1991, transmission and distribution losses between generation and end-use were about 211 billion kWh. Many of the inter-utility, interregional transmission corridors in the U.S. are heavily loaded during peak hours. Marginal line losses on heavily loaded lines can be as high as 12-18% of marginal generation. Transactions that go against prevailing power flows reduce total line losses, and hence total fuel consumption, within a region.

IMPLEMENTATION: On June 30, 1993, the Federal Energy Regulatory Commission initiated a generic inquiry on electric transmission pricing issues. In this inquiry, the commission requested comment on a wide range of transmission pricing issues, including the pricing of reverse flows. The economic and environmental benefits provided by reverse flows can be readily addressed in that proceeding. The Administration, through DOE, will support transmission pricing reform that reflects the benefits of reverse flows. Federal costs for this action are negligible.

MARKET IMPACT: Net regulatory cost to the electric industry is negligible since many if not all utilities will have to file revised transmission tariffs if the Commission implements a new pricing policy. Transmitting utilities may have some additional modeling to optimize transmission. This is a highly cost effective initiative which will produce net economic benefits apart from greenhouse gas reduction. Lower line losses translate directly into lower generation needs and reduced fuel costs. Also, reverse flows help avoid or defer the need for additional transmission capacity. This action reduces private capital costs by \$5 billion through 2000 because it decreases the need for transmission capacity (undiscounted 1991 dollars). This action yields energy savings worth about \$270 million through 2000, and continues to save energy over the next decade, for an additional savings worth approximately \$1 billion over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 0.8 MMT of carbon equivalent.

METHANE REDUCTIONS AND RECOVERY ACTIONS

Expand Natural Gas Star

DESCRIPTION: EPA will expand the *Natural Gas Star* program, which is a public/private partnership that reduces methane emissions by introducing and promoting cost-effective technologies and practices throughout the U.S. natural gas industry. *Natural Gas Star* provides technical assistance, implementation guidelines, and an information sharing network for gas companies to achieve cost effective emissions reductions. The expanded program targets production companies, and transmission and distribution companies not currently in the program. The new program also includes addition of a best management practice to the *Natural Gas Star* agreement calling for replacement of high-bleed pneumatics, a significant source of methane emissions, after 5 years rather than the current 7 years.

IMPLEMENTATION: This initiative expands the *Natural Gas Star* program that was launched in Spring 1993 and currently has 26 partner companies. EPA will do the following in FY1994/1995:

- Market the program to natural gas producers and processors.
- Develop and disseminate program materials aimed at producers and processors.
- Expand assessment and promotion of newly available technologies.
- Initiate analyses of state and other barriers to full-scale program penetration.

The program's reductions will be verified through company implementation reports, field testing, and engineering analysis. The Administration is proposing to obligate \$300 thousand in FY 1995 for this action and \$6 million through 2000.

MARKET IMPACT: This action stimulates about \$60 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields savings worth close to \$100 million through 2000, and continues to pay off over the next decade, for an additional savings worth about \$110 million over the period 2001-2010. The results of the program will include significant fuel savings, more profitable operations for participating companies, and the generation of additional jobs in the manufacture and installation of equipment.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 3.0 MMT of carbon equivalent.

Increase Stringency of Landfill Rules

DESCRIPTION: This action will increase the amount of landfill gas that must be recovered by landfills. Methane constitutes about 50% of landfill gas. The landfill New Source Performance Standard and Existing Source Guidelines, which require control of landfill gas under Sections 111 (b) and 111 (d) of the Clean Air Act, were proposed in May 1991. Since the proposal, EPA has conducted significant additional analysis, including an examination of the landfills affected by the rules that could profitably produce energy from their landfill gas. The final rule will be promulgated in Fall 1993. This action reflects the incremental impacts of increasing the stringency of the rule.

IMPLEMENTATION: EPA expects to issue the final rules regarding landfill gas emissions in 1993. Landfills affected by the rules will determine their landfill gas emissions rate and install a capture and control system. These landfills may choose to flare their gas or recover the energy value of the gas for sale or on-site use. Incremental Federal costs for this action are negligible.

MARKET IMPACT: Private investments will likely be made by medium to large landfills, as the final rule is expected to include an exemption for smaller landfills. Cost estimates and the value of energy savings for the rules will be available at final promulgation.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 4.2 MMT of carbon equivalent.

Expand Landfill Outreach Program

DESCRIPTION: EPA will encourage landfills to capture the methane that would otherwise be emitted and use it to produce electricity or sell it as a medium-Btu gas. The outreach program will overcome the barriers to profitable landfill methane recovery projects at landfills that are not affected by the EPA Landfill Gas Rules. The outreach program will provide information such as case studies and sample requests for proposal (RFPs) to landfill owner/operators, utilities, state regulators and others. Only about 10% of the more than 6,000 landfills in the United States will be affected by the Rules. Many additional "unaffected" landfills could profitably recover and use the methane they emit, but have not initiated projects because they face a number of barriers, such as disincentives for utility purchases of landfill gas, lack of information and misinformation, regulatory constraints such as difficult permitting procedures, and technological constraints.

IMPLEMENTATION: EPA will build on existing activities to design and assess the impact of the landfill rules. In FY1994/1995 EPA will:

- Release a case study report on landfill successes to raise awareness of emission reduction potential.
- Organize of a series of state and regional workshops on landfill energy recovery opportunities.
- Initiate site visits to develop feasibility analyses of project opportunities.

The Administration is proposing to obligate \$600 thousand in FY 1995 for this action and \$6.4 million through 2000.

MARKET IMPACT: This program promotes only profitable projects. This action stimulates about \$180 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields about \$140 million through 2000 in revenue from the sale of the energy produced from landfill gas, and continues to yield revenue over the next decade, for additional revenue worth close to \$270 million over the period 2001-2010.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.1 MMT of carbon equivalent.

Launch Coalbed Methane Outreach Program

DESCRIPTION: EPA and DOE will create an outreach program to raise the awareness of the potential for cost-effective emissions reductions with key coal companies and state agencies. It will also help to ensure that the Energy Policy Act provisions resolving coalbed methane ownership issues in the key states achieve the potential reductions in these states. The program includes development of outreach materials (technology descriptions, sample RFPs, cost/benefit analyses, financing information), an information clearinghouse, briefings for companies, states, utilities, and others, and demonstration projects. The program will target approximately 50 of the gassiest mines in the U.S.

IMPLEMENTATION: This program will build on existing activities of the EPA Ad-Hoc Working Group on Coalbed Methane and analytical efforts related to quantifying emissions and profitable reduction opportunities. For FY 1994/1 995 EPA and DOE will:

- Initiate state outreach efforts through workshops and meetings aimed at identifying and removing project barriers.
- Develop outreach materials on successful projects and available technologies.
- Expand industry discussions to identify candidate sites for feasibility studies.
- Initiate R&D efforts for promotion of new technologies (with DOE).

The Administration is proposing to obligate \$700 thousand in FY 1995 for this action and \$8.4 million through 2000.

MARKET IMPACT: Under this program, an estimated 10-15 coal mines with profitable opportunities to reduce methane emissions will take action. As a result of these projects, a significant number of jobs will be created in coalbed methane production and supporting industries. This action stimulates \$80 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields revenue from the sale of natural gas and/or electricity worth about \$90 million through 2000, and continues to pay off over the next decade, for additional revenue worth about \$160 million over the period 2001-2010.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 2.2 MMT of carbon equivalent.

Expand RD&D for Methane Recovery from Coal Mining

DESCRIPTION: This action expands RD&D efforts to broaden the range of cost-effective technologies and practices for recovering methane associated with mining. Methods include:

- Lower cost, more complete methods for pre-mining recovery of methane from coal seams, such as inert gas flooding;
- Methods for using in-mine de-gasification streams, such as enrichment for pipeline gas and electricity generation;
- Demonstration of the use of fuel cells and other state-of-the-art technologies for waste methane utilization, transferring appropriate practices to the coal industry.

IMPLEMENTATION: Existing RD&D programs at DOE will be augmented immediately, utilizing existing research and demonstration sites, laboratories, and staff. Efforts currently are underway to evaluate the potential applicability of these processes to eastern underground coal mines, and to evaluate the engineering/cost parameters of applying these technologies at selected mines. A new study of barriers to implementation of methane recovery will define new and expanded projects, including commercial demonstrations with industry participation. The DOE program implements provisions of Sec. 1306 of The Energy Policy Act of 1992. Commercial scale demonstration projects of promising combinations of techniques with industry participation will establish the viability and economics of recovery, expanding the scope of domestic coal seams that can recover methane. The Administration is proposing to obligate \$3 million in FY 1995 for this action and \$17 million through 2000.

MARKET IMPACT: After development and demonstration of improved technologies, coal mining companies and other parties will make substantial investments in vertical drilling of coal seams prior to mining and/or in horizontal and gob pile drilling and recovery during mining operations. Coal mining companies or other firms will invest in equipment to upgrade gases from mining operations to pipeline quality or to convert them into electricity. This action stimulates about \$200 million in private sector investment through 2000 (undiscounted 1991 dollars). This investment yields revenue from the sale of gas and electricity worth \$120 million through 2000, and continues to pay off over the next decade, for additional revenue worth about \$810 million over the period 2001-2010 (undiscounted 1991 dollars).

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.5 MMT of carbon equivalent.

Expand RD&D for Methane Recovery from Landfills

DESCRIPTION: This action expands the DOE program of research, development, and demonstration of technologies to recover and use methane from landfills. It also initiates administrative actions to promote adoption of technologies. This will facilitate design of landfills to maximize generation of methane and recover methane as electricity, fuel or pipeline gas. Elements include:

- A small scale demonstration of leachate recirculation and other techniques to enhance methane generation at an existing landfill site.
- Creation of a joint State/Federal coordination program to facilitate siting/permitting of enhanced recovery landfills.
- Expansion of RD&D to optimize, and demonstrate the technology and establish environmental performance.
- Demonstration of economic recovery from small landfills.
- Modifying environmental performance standards and regulatory requirements to remove unnecessary barriers to enhanced recovery technology in landfills.
- Demonstration of state-of-the-art technologies for utilizing methane.

IMPLEMENTATION: This action substantially expands existing RD&D programs at DOE and supports new joint demonstration projects with industry participation. It includes RD&D on optimization of waste treatment, a demonstration of leachate recirculation, a fuel cell demonstration, and gas cleaning studies. The President will issue a Federal Executive Order creating a joint State/Federal coordination program and is directing Federal agencies to examine regulations that are barriers to recovery of methane. The Administration is proposing to obligate \$1.5 million in FY 1995 for this action and \$9 million through 2000.

MARKET IMPACT: This action stimulates about \$200 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields revenue from the sale of the energy produced from landfill gas worth about \$80 million from 2000, and continues to yield revenue over the next decade, for an additional \$420 million over the period 2001-2010 (undiscounted 1991dollars).

EMISSIONS REDUCTIONS: This action reduces greenhouse gas emissions from projected 2000 levels by 1.0 MMT of carbon equivalent.

Expand *AgStar* Partnership Program with Livestock Producers

DESCRIPTION: EPA and USDA will expand the *AgStar* program to achieve 50% of the total reductions that can be profitably recovered from animal wastes. *AgStar* is an existing EPA voluntary pollution prevention program with the livestock industry, initially dairy and swine facilities. Animal manure management technology has improved since the 1970s and is now being successfully used in many sites across the country. Under this voluntary program, producers commit to survey their facilities to identify profitable options for capture and use of methane for on-farm power production. The program provides farmers with information in the form of demonstration projects and decision support software. Producers will install their most profitable option within a specified time period. EPA and USDA will target the program to key states, focusing its expansion efforts on large-scale producers of livestock. *AgStar* encourages the recovery and use of methane only where it is profitable to do so.

IMPLEMENTATION: The expanded *AgStar* program will build on the existing EPA *AgStar* program, which was launched in Summer 1993. For FY 1994/1995 the activities of the program will include:

- Development of standards and specifications for total methane recovery systems.
- Marketing of the program to swine and dairy producers.
- Development and dissemination of outreach materials to beef, dairy, and swine producers.
- Development of decision support software to aid producers in technical and economic assessments of options.
- Organization of a series of regional workshops to communicate program objectives and dissemination of program materials and software.

The Administration is proposing to obligate \$3 million in FY 1995 for this action and \$19 million through 2000.

MARKET IMPACT: This action stimulates about \$140 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). This investment yields savings worth close to \$120 million through 2000, and continues to pay off over the next decade, for an additional savings worth about \$180 million over the period 2001-2010. The investment will lead to significant private sector profits, reduced peak energy demand by farms, and generation of additional jobs providing and installing equipment.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.5 MMT of carbon equivalent.

Improve Ruminant Productivity and Product Marketing

DESCRIPTION: USDA will work with EPA on research, demonstration projects, and an outreach program targeted to reduce methane emissions from dairy and beef cattle, which are responsible for over 30 MMTCE of methane emissions per year. The Agencies will address the six main ways to improve management:

- Improved nutrition through mechanical and chemical feed processing and improved grazing management.
- Improved nutrition through strategic supplementation of feed as part of grazing, pasture and range management.
- Production enhancing agents to improve feed efficiency.
- Improved production through improved genetic characteristics.
- Improved production efficiency through improved reproduction.
- Controlling disease.

The agencies will also build on existing efforts to remove market barriers to and create incentives for increased production of milk and meat with lower fat content. Low-fat products cause less methane per unit produced than higher-fat products.

IMPLEMENTATION: The new program will build on existing technical assistance activities in the agencies to improve animal management and nutrition, identify profitable emission reduction opportunities, and quantify emissions. In FY 1994 and 1995, program activities will include:

- Initiation of regional field studies to refine emission estimates, nutrition deficiencies and the economics of reduction options.
- Design and testing of various marketing options aimed at reducing emissions.
- Develop and dissemination of information on profitable opportunities.

The Administration is proposing to obligate \$2 million in FY 1995 for this action and \$28 million through 2000.

MARKET IMPACT: This program will improve the productivity and profitability of farming operations throughout the United States. Significant benefits, in terms of more effective nutrition and animal management, will result from the program. Private investment is anticipated to be negligible. No energy market impact is projected.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.8 MMT of carbon equivalent.

**HFC, PFC, and NITROUS, OXIDE REDUCTION
ACTIONS**

Narrow Use of High GWP Chemicals Using the Clean Air Act and Product Stewardship to Reduce Emissions

DESCRIPTION: EPA will restrict the use and emission of high GWP (global warming potential) chemicals by encouraging product stewardship for long-lived gases and using Section 612 of the Clean Air Act Amendments of 1990 to narrow uses of high GWP CFC substitutes, such as HFCs and PFCs, based on an overall risk assessment.

EPA will create a partnership program with manufacturers of long lived HFCs and PFCs. Under the partnership program companies will commit to not selling those chemicals for emissive uses and to ensuring that users of long lived gases handle the material in an environmentally responsible manner -- by capturing and destroying the gas rather than emitting it into the atmosphere.

IMPLEMENTATION: Some aggressive companies have already initiated policies for "cradle-to-grave" responsible handling of high GWP chemicals. This initiative will expand these efforts and use them in conjunction with actions under Section 612. EPA has the authority to restrict uses of HFCs and PFCs if other alternatives to ozone depleting chemicals exist and pose less risk to human health and the environment.

In May 1993, EPA released a Notice of Proposed Rulemaking for Section 612 which has taken the first steps to restrict long-lived chemicals to high value uses. This initiative provides resources to EPA to continue to evaluate the overall impact on the environment from CFC substitutes and encourage the prudent use of long-lived, high GWP chemicals. The Administration is proposing to obligate \$2 million in FY 1995 for this action and \$9 million through 2000.

MARKET IMPACT: The private costs of these programs have not yet been estimated; but are expected to be low, principally because restrictions will occur only in cases where other alternatives are available. These actions will also stimulate the development of alternatives to replace high GWP or long-lived chemicals, creating new business opportunities. No energy market impact is projected.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 5.0 MMT of carbon equivalent.

Create Partnerships with Manufacturers of HCFC-22 to Eliminate HFC-23 Emissions

DESCRIPTION: EPA will step up efforts in a new partnership program with manufacturers of HCFC-22 to develop and implement processing practices or technologies to reduce HFC-23 as a byproduct of HCFC-22 production where it is technically feasible and cost-effective. Currently 2-4% of the HCFC-22 production is released as HFC-23, a potent greenhouse gas. Participating manufacturers agree to reduce emissions of HFC-23 to 50% of 1990 emissions.

IMPLEMENTATION: Manufacturer response has been highly positive. The U.S. HCFC-22 manufacturers signed letters of intent to reduce HFC-23 emission levels by 2000. EPA will assist in conducting economic and technical analysis for different emission reduction techniques, such as recovery and destruction technologies and process changes. From 1994-1996 EPA will also refine estimates of emissions, document reductions that have occurred between 1990 and present, and assist in developing methods to measure and ensure emission reductions. The Administration is proposing to obligate \$1 million in FY 1995 for this action and \$13 million through 2000.

MARKET IMPACT: U.S. companies will be seen as worldwide leaders in developing processing practices and technologies to reduce HFC-23 emissions. Participating companies will incur increased costs of manufacturing if the production process has to be changed or if technologies need to be added to reduce emissions. The Partnership effort will be designed to achieve the highest cost-effective emission reductions at the lowest cost to manufacturers, but precise estimates of private investment are not yet available. No energy market impact is projected.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 5.0 MMT of carbon equivalent.

Launch Partnership With Aluminum Producers To Reduce Emissions From Manufacturing Processes

DESCRIPTION: EPA will partner with aluminum producers to reduce emissions of carbon tetrafluoride (CF₄) and carbon hexafluoride (Q₂F₆) where technically feasible and cost-effective. CF₄ and Q₂F₆ are potent greenhouse gases with global warming potentials of about 5,000 and 10,000 times that of CO₂, respectively, and lifetimes that exceed 10,000 years. These gases are emitted as by-products of the primary aluminum production process. Emissions of CF₄ and C₂F₆ may be reduced by 30-60% through management and technological reforms by the aluminum industry. Aluminum companies will be encouraged to agree to a target reduction by 2000. Their emissions will periodically be measured to ensure that the goals of the action are achieved. This action also includes support of research efforts, such as developing a better understanding of emissions and control options.

IMPLEMENTATION: The program mechanism will be a partnership agreement between the company and EPA. This program will build on existing activities underway in the summer of 1993 with the aluminum industry to identify emission reductions opportunities. In FY1994 EPA will:

- Conduct site visits to aluminum companies to assess processes and refine emission estimates.
- Organize a series of workshops to assess available technologies and develop partnership program components.

The Administration is proposing to obligate \$ 600 thousand in FY 1995 for this action and \$3.1 million through 2000.

MARKET IMPACT: In many cases, reductions will lead to profitable increases in energy efficiency. In some cases, moderate up-front investment in new technology may be necessary. The net cost will be negligible; private investment to achieve reductions will be offset by energy savings. No precise estimates of private investments or energy savings are available.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 1.8 MMT of carbon equivalent.

Improve Efficiency of Fertilizer Nitrogen Use

The complete description of this action is in the Industrial Demand Section.

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EMISSIONS REDUCTION: This action saves energy through decreases in energy-intensive fertilizer production. The energy savings from this action plus the energy savings from the action to reduce pesticide use combine to reduce greenhouse gas emissions from projected 2000 levels by 2.7 MMT of carbon equivalent. This fertilizer action also reduces emissions of nitrous oxide, and so additionally reduces

Forestry Actions

Reduce the Depletion of Nonindustrial Private Forests

DESCRIPTION: USDA will take action to reduce the depletion of nonindustrial private forests, which make up about 50 percent of the Nation's timberlands. Currently, 42 million acres (16%) of U.S. nonindustrial private timberlands are already in poor condition, due primarily to overharvesting. Each year, an additional 533,000 acres are overharvested. USDA will reduce this annual overharvesting by providing private forest landowners with free timber evaluations by public and private foresters. These timber evaluations will be written plans that describe the owner's timber (tree species composition, age, stocking, growth rate, and approximate volume and value) and recommend management options for the next 10 years. If the recommendation is to harvest timber, a harvesting prescription will be prepared that ensures adequate stocking and protection of the residual stand and/or regeneration of the stand by natural or artificial means.

IMPLEMENTATION: USDA will take action under the Cooperative Forestry Assistance Act of 1978 (16 USC 2101 et seq.), as amended by the Forest Stewardship Act of 1990 as Title XII of the Food, Agriculture, Conservation, and Trade Act of 1990 (7 USC 1421 note). USDA has long-standing authority to assist landowners with forest management on private lands. This initiative will operate as a new special practice under the Stewardship Incentive Program, and can be made operational under existing laws and guidelines within 45 days. In the next 3 to 6 months, USDA will establish new special practices under the Forest Service Stewardship Program, survey the status of tree seedling production, begin signing up landowners for timber evaluations. The Administration is proposing to obligate \$200 thousand in FY 1995 for this action and \$4 million through 2000.

MARKET IMPACT: There is limited expense to private landowners and minimal time required to meet with foresters to discuss the timber evaluations in the context of their ownership objectives. Landowners are responsible for all costs of actually preparing and conducting actual timber sales. Over the short term, less timber volume per acre will be harvested from private lands. However, reductions in overharvesting and stand depletion will result in larger and more sustainable long run timber supplies, benefiting landowners, workers, owners in the wood-processing industry, and consumers. The forestry actions will provide carbon uptake, but no energy savings are anticipated.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 4.0 MMT of carbon equivalent.

Accelerate Tree Planting In Nonindustrial Private Forests

DESCRIPTION: USDA will step up efforts to increase tree planting in existing nonstocked and poorly stocked nonindustrial private forest land by 233 thousand acres per year within 5 years. Trees capture and store carbon as they grow (about one-half of the dry weight of wood is carbon), and additional carbon is captured and stored through the increase of organic matter in the soil, surface litter and in understory plants. Approximately 2.5 million acres of trees are planted each year.

Over the next 6 months USDA will establish new special practices under the Forest Service Stewardship Program, survey the status of tree seedling production, and begin signing up landowners for timber evaluations. USDA then will provide technical assistance and cost-sharing of up to 75 percent for tree planting and site preparation. Currently, tree planting under USDA cost-share programs is 435,000 acres per year, or 42 percent of all planting on nonindustrial private lands. Under the expanded program USDA will increase assisted planting by 50%, approximately 233,000 acres by 1997.

IMPLEMENTATION: Various laws relating to this activity are consolidated into the Cooperative Forestry Assistance Act of 1978 (16 USC 2101 et seq.), as amended by the Forest Stewardship Act of 1990 as Title XII of the Food, Agriculture, Conservation, and Trade Act of 1990 (7 USC 1421 note). Increased tree planting will be achieved through the regular tree planting practice of the Stewardship Incentive Program or as a new special practice, which can be implemented under existing laws and regulations within 45 days. Assistance to forest landowners will be provided through the established USDA Forest Service-State Forester delivery system. There is no increase in Federal staffing at the field level, as State Service Foresters and private consulting foresters provide on-the-ground assistance to landowners. Private landowners will have the choice of either planting the trees themselves, or as is more common, hiring a commercial tree planting contractor. The Administration is proposing to obligate \$3.1 million in FY 1995 for this action and \$71 million through 2000.

MARKET IMPACT: This action stimulates about \$40 million in private sector investment for the period 1994-2000 (undiscounted 1991 dollars). In addition, there are positive economic impacts for tree nurseries, foresters needed to assist landowners, and tree planting contractors and their employees. Since tree planting occurs on forest lands, there is no displacement of agriculture or other economic land-use activities. The forestry actions will provide carbon uptake, but no energy savings are anticipated.

EMISSIONS REDUCTION: This action reduces greenhouse gas emissions from projected 2000 levels by 0.5 MMT of carbon equivalent. The reductions associated with this initiative will be most visible in the years after 2015 due to the rate of carbon sequestration over a tree's lifetime.

Accelerate Source Reduction, Pollution Prevention and Recycling

The description of this action is in the Industrial Sector Energy-Efficiency Actions section.

EMISSIONS REDUCTION: This action results in fewer trees being harvested for producing paper, leading to direct carbon sequestration. The carbon sequestration component of this action reduce greenhouse gas emissions from projected 2000 levels by 5.0 MMT of carbon equivalent.

Expand Cool Communities Program in Cities and Federal Facilities

The description of this action is in the Residential Demand Sector Actions section.

EMISSIONS REDUCTION: Trees planted for *Cool Communities* also sequester carbon by absorbing carbon dioxide from the atmosphere during growth and photosynthesis. The program increases carbon uptake by 0.5 MMT of carbon equivalent by 2000.