



Climate Change: Federal Laws and Policies Related to Greenhouse Gas Reductions

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Summary

Climate change is viewed as a global issue, but proposed responses generally require action at the national level. In 1992, the United States ratified the United Nations Framework Convention on Climate Change (UNFCCC), which called on industrialized countries to take the lead in reducing greenhouse gases. Over the past 16 years, a variety of voluntary and regulatory actions have been proposed or undertaken in the United States, including monitoring of electric utility carbon dioxide emissions, improved appliance efficiency, and incentives for developing renewable energy sources. This report provides background on the evolution of U.S. climate change policy, from ratification of the UNFCCC to the George W. Bush Administration's 2001 rejection of the Kyoto Protocol to the present. Recent federal court decisions—most notably the Supreme Court's 2007 decision in *Massachusetts v. EPA* that the Environmental Protection Agency has the authority to regulate motor vehicle greenhouse gas emissions under the Clean Air Act—have raised the issue of whether EPA should directly regulate greenhouse gases. This report focuses on major regulatory programs that monitor or reduce greenhouse gas emissions, along with their estimated effect on emissions levels.

The George H. W. Bush, Clinton, and George W. Bush Administrations largely relied on voluntary initiatives to reduce the growth of greenhouse gas emissions. This focus was particularly evident in the current Administration's 2006 Climate Action Report (CAR), submitted under the provisions of the UNFCCC. Of roughly 50 programs summarized in the 2006 CAR, seven were described as "regulatory." However, this small subset of the total U.S. effort accounts for a large share of greenhouse gas emission reductions achieved over the past decade-and-a-half. In general, these efforts were established and implemented in response to concerns other than climate change, such as energy efficiency and air quality.

The Energy Policy Act of 2005 (P.L. 109-58) included provisions indirectly related to greenhouse gas emissions, such as energy efficiency and renewable energy. The Energy Independence and Security Act of 2007 (P.L. 110-140) addresses renewable energy and conservation, but also includes provisions specifically on climate change. These include a requirement for the use of renewable fuels with lower lifecycle greenhouse gas emissions than petroleum fuels, and the establishment of an Office of Climate Change and Environment in the Department of Transportation to implement research on mitigating the causes and addressing the effects of climate change on transportation. In June 2008, the Senate considered a bill (S. 3036) to establish an economy-wide cap-and-trade system to reduce greenhouse gas emissions. However, after discussion, a cloture motion on this bill failed, and the bill was tabled.

While some provisions in energy laws enacted over the past 16 years have led to lower greenhouse gas emissions or addressed climate change directly, other provisions in those same laws have almost certainly resulted in higher emissions. To date, no energy law has had reducing greenhouse gas emissions as the main organizing principle. Energy-related activities are responsible for about 86% of the country's greenhouse gas emissions, and 98% of its carbon dioxide emissions. Climate change policy directed at reducing greenhouse gas emissions must address energy supply and consumption and, thus, be integrated with energy policy. This will be a pivotal challenge to the 111th Congress's and the incoming Administration's anticipated efforts to enact legislation to limit greenhouse gas emissions.

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Introduction

Climate change is viewed as a global issue, but proposed responses generally require action at the national level. In 1992, the United States ratified the United Nations Framework Convention on Climate Change (UNFCCC) which called on industrialized countries to take the lead in reducing greenhouse gases. Over the past 16 years, a variety of voluntary and regulatory actions have been proposed or undertaken in the United States, including monitoring of utility carbon dioxide emissions, improved appliance efficiency, and incentives for developing renewable energy sources.

In 2001, President George W. Bush rejected the Kyoto Protocol to the UNFCCC, which called for legally binding commitments by developed countries to reduce their greenhouse gas emissions.¹ He also rejected the concept of mandatory emissions reductions. Since then, the Bush Administration has focused U.S. climate change policy on voluntary initiatives to reduce the growth in greenhouse gas emissions. This focus was particularly evident in the Administration's 2006 Climate Action Report (CAR) submitted under the provisions of the UNFCCC. Of the roughly 50 programs summarized in the 2006 CAR, only seven were described as "regulatory."² These regulatory programs were generally implemented to achieve energy or environmental goals other than the reduction of greenhouse gas emissions, but produced a concomitant emissions reduction. In this sense, they could be considered the results of a "no regrets"³ policy in which climate change effects resulting from related air quality and energy policies are included in the decision-making process on new or modified rules.

However, indirect regulation and "no regrets" policies may be supplanted by direct regulation of greenhouse gas emissions. In its 2007 decision in *Massachusetts v. EPA*, the Supreme Court found that the Environmental Protection Agency has the authority to regulate greenhouse gas emissions from motor vehicles under the Clean Air Act.⁴ Further, the court directed EPA to begin the process of determining whether greenhouse gases endanger public health and welfare. If EPA finds that they do, then EPA would be required under the Clean Air Act to regulate their emission. However, it is also possible that EPA would find that greenhouse gases do not endanger public health and welfare, or that there is insufficient evidence to make a finding either way.

Further, in June 2008, the Senate considered legislation (S. 3036) to enact an economy-wide cap-and-trade system to reduce U.S. greenhouse gas emissions.⁵ However, a cloture motion on this bill failed, and the bill was ultimately tabled. A cap-and-trade system is the favored approach of

¹ For further information, see CRS Report RL33826, *Climate Change: The Kyoto Protocol, Bali "Action Plan," and International Actions*, by Susan R. Fletcher and Larry Parker.

² Most of the programs outlined in the report involve research, technical assistance, information gathering, or technical assistance programs initiated by the federal government, or voluntary emissions reduction programs coordinated by the government.

³ The "no regrets" policy was one of establishing programs for other purposes, that would have concomitant greenhouse gas reductions. Therefore, only those policies that reduced greenhouse gas emissions at no additional cost were considered.

⁴ For more information, see CRS Report RS22665, *The Supreme Court's Climate Change Decision: Massachusetts v. EPA*, by Robert Meltz.

⁵ For more information on cap-and-trade legislation in the 110th Congress, see CRS Report RL33846, *Greenhouse Gas Reduction: Cap-and-Trade Bills in the 110th Congress*, by Larry Parker, Brent D. Yacobucci, and Jonathan L. Ramseur.

the incoming Administration, and similar legislation may have a better chance of passage in the 111th Congress.

This report provides background on the evolution of U.S. climate change policy from ratification of the UNFCCC to the George W. Bush Administration's rejection of the Kyoto Protocol programs, to the present. Current major regulatory programs that monitor or reduce greenhouse gas emissions are identified, along with their estimated effect on greenhouse gas emissions. Finally, energy legislation enacted in the 109th and 110th Congresses that could directly or indirectly reduce greenhouse gases is discussed.

Background to Federal Climate Change Policy: From “No Regrets” Back to “No Regrets”

The International Framework

U.S. policy toward global climate change evolved from a “study only” to a “study and action” orientation in 1992 with completion of the UNFCCC in Rio de Janeiro. Both nationally and internationally, much of the debate over policies to address climate change has focused on energy use, because fossil fuel consumption is the main source of greenhouse gas emissions in most countries. During the deliberations on the UNFCCC, the National Academy of Sciences (NAS) released a report on global warming. In this report, *Policy Implications of Greenhouse Warming*, the NAS stated, “The United States could reduce or offset its greenhouse gas emissions by between 10 and 40 percent of 1990 levels at low cost, or at some net savings, if proper policies are implemented.”⁶ The NAS's energy policy recommendations focused on increasing energy conservation and efficiency, incorporating global warming as a factor in future energy planning, and studying and eventually implementing “full social cost pricing” of energy.

Although the report was widely publicized, many of its recommendations were not applied. Driven by concerns about scientific uncertainty and the potential costs to the economy of measures to reduce greenhouse gas emissions, the George H. W. Bush Administration refused to agree to the negotiation of a binding agreement to reduce the nation's carbon dioxide (CO₂) emissions by a specific date. The UNFCCC reflects the negotiating position of the United States and many other countries in that it called only for voluntary control measures. Senate floor debate on ratification of the UNFCCC brought out concerns by some Senators about the *cost* of compliance, its impact on the country's economic *competitiveness*, and the *comprehensiveness* with respect to the omission of reduction commitments for developing countries—concerns that were lessened because of the non-binding nature of the reduction goals.⁷ Those arguing for emissions controls argued that controls could create jobs and enhance economic health, and that high emissions indicated inefficiency.

Asserting that “the developed country Parties should take the lead” in reducing emissions, the UNFCCC set the goal that developed countries aim to return their greenhouse gas emissions to

⁶ National Academy of Sciences, *Policy Implications of Greenhouse Warming* (Washington, DC: National Academy Press, 1991), p. 73.

⁷ *Congressional Record*, vol. 138 (October 7, 1992), 33520-33527.

1990 levels by the year 2000.⁸ In line with this goal, developed countries agreed in principle to adopt national plans and policy options to mitigate climate change by reducing anthropogenic emissions and enhancing sinks. The United States submitted such plans in 1992, 1994, 1997, 2002, and 2006, as discussed below.⁹

Developing Programs: EPACT and Climate Action Plans

The Energy Policy Act of 1992 (EPACT) is the principal statutory basis for programs that constitute the U.S. response to the UNFCCC.¹⁰ Programs developed pursuant to EPACT, including appliance energy efficiency standards and updated building codes, are discussed below. Primarily crafted as part of an energy policy response to the Persian Gulf War of 1991, its energy conservation, renewable energy, and other titles were also seen as having a beneficial effect on global climate change concerns being debated at that time in international circles. In its 1992 submission to the UNFCCC, the George H. W. Bush Administration listed 11 different titles of EPACT as “extremely important” to its overall strategy of reducing greenhouse gases.¹¹

Some of the previously referenced recommendations of the NAS were embodied in several sections of EPACT. These sections included provisions to establish energy-efficiency standards, promote dissemination of energy-saving information, establish several national research and development programs related to deployment of energy-efficiency technologies, and authorize the Department of Energy (DOE) to evaluate cost-effective energy efficiency technologies. In addition to these activities to improve energy efficiency, EPACT Title XVI aimed to incorporate global warming concerns in energy policy planning. Title XVI authorized DOE to collect, analyze, and report information on climate change. Resulting DOE activities included a report on the various economic, energy, social, environmental, and competitive implications of reducing greenhouse gas emissions; the development of a least-cost energy strategy designed to achieve “the stabilization and eventual reduction in the generation of greenhouse gases”; the creation of a Director of Climate Change; and the development of an inventory of greenhouse gas emissions and early reductions in such emissions.

Indeed, EPACT’s authors anticipated that it would help stabilize or even reduce emissions of greenhouse gases at little cost, in line with the 1991 NAS report. As stated by the House report:

The committee expects that, if fully implemented, H.R. 776 will result in a substantial reduction in U.S. greenhouse gas emissions relative to forecasted levels. The bulk of these reductions result from the programs that will demonstrate and transfer advanced clean coal and renewable technologies abroad, and from the domestic energy efficiency and renewable energy initiatives. The provisions on electric utilities, alternative fuels and coalbed methane are also significant.¹²

⁸ *United Nations Framework Convention on Climate Change (UNFCCC)*, Article 3, Section 1.

⁹ For a more detailed discussion, see CRS Report RL30024, *U.S. Global Climate Change Policy: Evolving Views on Cost, Competitiveness, and Comprehensiveness*, by Larry Parker and John Blodgett.

¹⁰ The other primary source of greenhouse-gas related regulations is the Clean Air Act, particularly the 1990 Amendments. Clean Air Act regulations—concerning mandatory carbon dioxide monitoring by electricity generators, landfill emissions reductions, and the control of ozone depleting substances—are discussed later in this report.

¹¹ Department of State, *National Action Plan for Global Climate Change* (Washington, DC: Department of State, 1992), p. 73.

¹² Committee on Energy and Commerce, *Comprehensive National Energy Policy Act*, H.Rept. 102-474, Part 1, March (continued...)

The notion that the United States could meet modest CO₂ emission reduction goals at little or no cost underlies many of the global climate change initiatives during the previous Bush and Clinton Administrations, including the George H. W. Bush Administration's "No Regrets" policy and 1992 Climate Action Plan, and the Clinton Administration's 1994 and 1997 Climate Action Plans.¹³ Using such an approach to climate change policy, neither of these administrations requested regulatory authority from Congress to implement a climate change policy. Both advocated strategies of undertaking governmental implementing actions that could be done administratively (unless Congress legislated otherwise) and of creating incentives for private industry to voluntarily undertake emissions reduction initiatives.

The Clinton Action Plans were similar to the plan developed under the George H. W. Bush Administration. Both were designed to foster market choices that would conserve energy, increase energy efficiency, and encourage natural gas use. Both were also designed to strengthen selected regulatory standards that concomitantly reduced greenhouse gas emissions—such as landfill regulations that curtail methane releases. Several actions in the 1994 Clinton plan expanded programs listed in the George H. W. Bush Administration's plan by augmenting funding or technical support to increase anticipated reductions. Other Clinton proposals were new: Examples included a "Golden Carrot" program to induce efficiency improvements of industrial equipment; a renewable energy consortium; a program to encourage employers to replace parking subsidies with cash incentives to ride transit, car pool, or find other ways to commute; and a program to promote more efficient nitrogen fertilizer use.¹⁴

Rejection of the Kyoto Protocol

As it became clear that the voluntary 1992 greenhouse gas emission reduction goals would not be met, parties to the UNFCCC began negotiations that culminated in the 1997 Kyoto Protocol to the UNFCCC. This protocol outlined legally binding emissions reductions for developed countries to specified amounts below 1990 levels, averaged over the years 2008 to 2012. The Clinton Administration committed to a 7% reduction below 1990 levels. The Kyoto Protocol, if it had been submitted to the Senate and ratified, would have changed the U.S. commitment from a voluntary one to a binding commitment. Critics of the Kyoto Protocol raised concerns similar to those debated in connection with the UNFCCC in 1992: concerns about cost, comprehensiveness, and competitiveness. The possibility of failing to comply with a binding commitment intensified the focus on potential costs of the U.S. global climate change policy. The United States, along with most of the world, failed to meet the goal set at Rio of returning 2000 emissions to the level that existed in 1990, a fact that raises questions about the premise that significant greenhouse gas reductions can be achieved at little or no costs.¹⁵ For those who believe substantial reductions in greenhouse gas emissions would entail substantial costs, the Kyoto Protocol's potential costs led

(...continued)

30, 1992, p. 152.

¹³ On the "no regrets" policy of the George H. W. Bush Administration, see C. Boyden Gray and David B. Rivkin, Jr., "A 'No Regrets' Environmental Policy," *Foreign Policy*, summer 1991, pp. 47-65; for the various action plans, see U.S. Department of State, *National Action Plan for Global Climate Change*, Department of State Publication 10026, December 1992; U.S. Department of State, *Climate Action Report*, Department of State Publication, 1994; and U.S. Department of State, *Climate Action Report*, Department of State Publication 10496, July 1997.

¹⁴ President Clinton and Vice President Gore, *The Climate Change Action Plan*, White House, October 1993.

¹⁵ Indeed, U.S. emissions of greenhouse gases were 14% above 1990 levels in 2000. Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks*, Washington, DC, April 2002, p. ES-3.

to concerns about its effects on the country's competitiveness and its exclusion of developing countries from mandatory emission reductions (comprehensiveness).

That cost, competitiveness, and comprehensiveness remain pivotal factors in climate change policy is illustrated by the George W. Bush Administration's rejection of the Kyoto Protocol early in 2001. In his June 11, 2001, speech on global climate change, the President stated that the Kyoto Protocol was "fatally flawed in fundamental ways." A primary flaw outlined by the President is the exemption of China and other large developing countries from its emissions reduction provisions. This "comprehensiveness" concern was closely followed by "cost" and "competitiveness" concerns. President Bush stated:

Kyoto is, in many ways, unrealistic. Many countries cannot meet their Kyoto targets. The targets themselves are arbitrary and not based upon science. For America, complying with those mandates would have a negative economic impact with layoffs of workers and price increases for consumers. And when you evaluate all these flaws, most reasonable people will understand that it's not sound public policy.¹⁶

To respond to global climate change, President Bush called for a new approach focused on science and on flexible control mechanisms that employ market-based incentives. Among the principles that the President argued should guide such a program were the following:

We must always act to ensure continued economic growth and prosperity for our citizens and for citizens throughout the world.... And finally, our approach must be based on global participation, including that of developing countries whose net greenhouse gas emissions now exceed those in the developed countries.¹⁷

The Administration's 2001 proposal initiated a new voluntary greenhouse gas reduction program, similar to ones introduced in previous administrations. The plan focuses on improving the carbon intensity of the economy, reducing current emissions of 183 metric tons of carbon equivalent per million dollars of GDP to 151 metric tons per million dollars of GDP by 2012. The plan proposed several voluntary initiatives, along with increased spending and tax incentives, to achieve this goal. However, the Administration stated that three-quarters of the projected reduction would be achieved through current efforts underway, not by new initiatives. The Administration projected that by 2010, the program could result in an emissions reduction of approximately 4.5% relative to "business as usual." However, this level would still be approximately 28% higher than the 1990 level defined by the UNFCCC. Further, without explicit requirements, it is unclear whether the targets set by the Administration will be met.

A key piece of the Administration's proposal was announced on February 12, 2003.¹⁸ Climate, Voluntary Innovative Sector Initiatives: Opportunities Now (Climate VISION) was created in response to President Bush's goal of reducing greenhouse gas intensity of the U.S. economy.¹⁹

¹⁶ President George W. Bush, *President Bush's Speech on Global Climate Change*, June 11, 2001.

¹⁷ Ibid.

¹⁸ Environmental Protection Agency, *Bush Administration Launches "Climate VISION."* February 12, 2003.

¹⁹ Greenhouse gas intensity is a measure of emissions per unit of economic activity (often expressed as tons of emissions per thousand or million dollars of Gross Domestic Product). For more on greenhouse gas intensity, see CRS Report 98-235, *Global Climate Change: U.S. Greenhouse Gas Emissions—Status, Trends, and Projections*, by John Blodgett and Larry Parker.

Climate VISION aims to assist energy-intensive sectors in developing plans to reduce greenhouse gas intensity, and to publicly recognize the efforts of those sectors.

Another Administration initiative, the Asia-Pacific Partnership on Clean Development and Climate, focuses on international efforts to reduce greenhouse gas emissions outside of the Kyoto Protocol. Of the six countries, the United States and Australia have rejected Kyoto; three countries—China, India, and Korea—are not subject to binding limits under Kyoto. Only one member of the partnership, Japan, has ratified the Kyoto Protocol. The partnership is focused on development and trade of clean energy technologies as well as emissions reductions from key sectors.²⁰

This international initiative was followed in May 2007 by the President's announcement that the United States would convene a meeting of the world's "major economies" that are responsible for most greenhouse gas emissions. Held in September 2007, the final statements of the "Major Economies Meeting on Energy Security and Climate Change" emphasized the need to integrate such meetings into the overall UNFCCC negotiations. The U.S. summary of the meeting focused on the "aspirational" nature of reduction goals, reflecting the Administration's rejection of mandatory reduction targets.

Regulatory Programs Affecting Emissions of Greenhouse Gases

As described above, current federal actions that directly address greenhouse gases focus on research, information, and voluntary programs. Each of the Climate Action Reports submitted by the United States to the UNFCCC has included a compilation of the several dozen programs that various administrations have felt are relevant to reducing U.S. greenhouse gas emissions.²¹ Regulatory measures that have reduced greenhouse gas emissions are a small subset of the total U.S. effort numerically, but are responsible for a proportionally larger share of greenhouse gas emission reductions.²² In general, these regulatory programs were established and implemented primarily for reasons other than climate change concerns. It should be noted that reductions from these programs combined represent about 3% of year 2000 greenhouse gas emissions, and total U.S. emissions have continued to grow: emissions increased approximately 3% between 2000 and 2005; emissions have grown approximately 17% since 1990.²³

The list of federal regulatory programs discussed here is primarily drawn from activities listed by the George W. Bush Administration in its most recent (2006) submission to UNFCCC.²⁴ The

²⁰ <http://www.asiapacificpartnership.org/>

²¹ For the most recent compilation, see U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007.

²² For example, EPA regulations on landfills and Significant New Alternatives Policy Determinations (SNAP) account for 35 million metric tons of the 255 million metric tons (carbon dioxide equivalent) in claimed reductions by the George W. Bush Administration for the year 2002 (14% of total). U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007. Both the landfill regulations and SNAP are discussed below.

²³ U.S. Energy Information Administration, *Emissions of Greenhouse Gases in the United States 2005*, Washington, DC, November 2006.

²⁴ *Ibid.*

submission to UNFCCC focused on mandatory programs, but numerous voluntary programs have also been implemented over the past 16 years. This section discusses the seven regulatory programs listed in the Climate Action Report, as well as two additional regulatory programs, carbon dioxide monitoring by electricity generators, and renewable electricity generation requirements (eliminated by P.L. 109-58) not included in the list. These programs' estimated effects on greenhouse gas emissions are summarized in **Table 1**.

Table 1. Estimated Greenhouse Gas Reductions from Federal Regulatory Actions

Program	Estimated GHG Reduction (million metric tons)		
	2002	2012	2020
Landfill Rule	8.7	9.5	9.9
Significant New Alternatives Program	26.0	149.6	222.9
Residential Appliance Standards	N/A	5.1	17.3
Commercial Building Codes	N/A	0.5	3.1
Corporate Average Fuel Economy	0.0	41.8	76.7
Renewable Fuel Standard	N/A	N/A	N/A
Distributed Energy Resources	12.1	23.8	57.2
Total Reductions from Regulatory Programs	47	230	387
Total Reductions from all Federal Programs	255	797	1560

Source: U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007. Table 4-2.

Note: Totals may not sum due to rounding. "N/A" indicates that although emissions reductions are expected, there may not be enough data currently to estimate those reductions, or that expected reductions are not achieved until later years.

Energy and Environmental Programs Related to Emissions Reductions

Emissions Reductions from Landfills

Section 305 of the 1990 Clean Air Act Amendments requires EPA to control emissions of a variety of air pollutants from new and existing large solid waste landfills.²⁵ Specifically, the section requires EPA to promulgate New Source Performance Standards (NSPS) for new municipal solid waste landfills, and emissions guidelines for existing landfills to reduce emissions

²⁵ Landfill gas contains methane, carbon dioxide, and numerous non-methane organic compounds (NMOCs), including vinyl chloride, toluene, and benzene.

of non-methane organic compounds (NMOCs), including ozone-producing volatile organic compounds (VOCs) and air toxics. Regulations promulgated in 1996 require large landfills that emit landfill gases in excess of 50 metric tons per year to control emissions.²⁶

The primary driver for the landfill regulations was reducing formation of ground/surface level ozone (smog), and air toxics. However, in promulgating the rule, the Clinton Administration noted that landfills were the largest U.S. source of emissions of the greenhouse gas methane (40%), and that the rule would have the indirect benefit of reducing methane emissions by 50%.²⁷ In its 2006 Climate Action Report, the current Administration estimated that the year 2002 methane emissions reductions achieved by the rule were 8.7 million metric tons of carbon dioxide equivalent, predicted to increase to 9.9 million metric tons by 2020.²⁸

Significant New Alternatives Policy (SNAP) Determinations

Many ozone-depleting substances are also greenhouse gases (such as perfluorocarbons). Therefore, efforts to protect the ozone layer also tend to reduce greenhouse gas emissions. There is a complex scientific relationship between ozone depletion, ozone-depleting chemicals and climate change.

Title VI of the 1990 Clean Air Act Amendments represents the United States' primary response on the domestic front to the ozone depletion issue. It also implements this country's international responsibilities under the Montreal Protocol to Reduce Ozone-Depleting Substances.²⁹ Section 612 requires EPA to develop a program to identify alternatives to ozone depleting substances banned under the Montreal Protocol.

In determining the acceptability of an alternative, EPA is to assess the overall risk to human health or the environment that the alternative poses, compared with other alternatives. In promulgating the implementing regulation for the program in 1994, EPA identified increased global warming as one of the risk criteria that it would use in determining the acceptability of an alternative.³⁰

SNAP determinations focus on the global warming potential of various substitutes used in place of the ozone-depleting chemicals banned under the Montreal Protocol, not on the global warming potential of the banned ozone-depleting chemicals themselves.

Under the regulation, EPA has restricted or narrowed the use of hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) where alternatives with lower global warming potentials exist. EPA estimates that the restrictions reduced greenhouse gas emissions by 26 million metric tons of carbon dioxide equivalent in 2002, and projects a further reduction of nearly 200 million metric tons (for a total of 223 million metric tons) by 2020.³¹

²⁶ 61 *Federal Register* 9905-9944 (March 12, 1996).

²⁷ EPA, *Fact Sheet: Final Air Regulations for Municipal Solid Waste Landfills*, March 1, 1996. This is due to the fact that techniques to reduce methane and NMOCs are basically the same.

²⁸ U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007, p. 59.

²⁹ It should be noted that emissions controlled under the Montreal Protocol are separate from those controlled by the Kyoto Protocol, and any reductions in ozone-depleting compounds would not count toward Kyoto Protocol targets.

³⁰ 59 *Federal Register* 13049 (March 18, 1994).

³¹ U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007, p. 58.

Residential Appliance Standards

The 1987 National Appliance Energy Conservation Act (NAECA)³² set minimum efficiency standards for many major appliances.³³ The Energy Policy Act of 1992 (EPACT) expanded the list of covered appliances and allowed for future standards development for other products.³⁴ Under NAECA and EPACT, the Department of Energy must develop mandatory energy efficiency standards for these appliances, and review them in accordance with a statutorily set schedule to determine whether they are sufficiently stringent. DOE is required to set standards designed to achieve the maximum improvement in energy efficiency it believes is “technically feasible and economically justifiable.”³⁵

The primary driver for residential appliance standards has been energy conservation. In 1997, the Clinton Administration estimated that the appliance standards would save almost a quad (1 quadrillion Btu) of energy, resulting in a 21.6 million metric ton reduction in carbon emissions by the year 2010.³⁶ For the 2006 Climate Action Report, DOE estimates reductions of 5 million metric tons of carbon dioxide in 2012, increasing to 17 million metric tons in 2020.³⁷

Updating State Commercial Building Codes

Section 101 of EPACT requires DOE to review and update provisions of the commercial building code with respect to energy efficiency.³⁸ Specifically, DOE is directed to determine whether revisions to the ASHRAE³⁹ Standard 90.1—1989 (and any future revisions) would improve energy efficiency in commercial buildings. If DOE determines that revisions would improve energy efficiency, states are required to review and update their commercial building codes accordingly, with respect to improving energy efficiency. In July 2002, DOE determined that ASHRAE/IESNA Standard 90.1—1999 would save energy in commercial buildings.⁴⁰ Thus, states were required to review and update their commercial building codes by July 15, 2004.⁴¹ The Energy Policy Act of 2005 requires further updates to state commercial building standards.

³² P.L. 100-12.

³³ As amended in 1988, appliances included refrigerators, refrigerator-freezers, freezers, room air conditioners, fluorescent lamp ballasts, incandescent reflector lamps, clothes dryers, clothes washers, dishwashers, kitchen ranges and ovens, pool heaters, television sets (withdrawn in 1995), and water heaters.

³⁴ Additional appliances included commercial building heating and air conditioning equipment, water heaters, certain incandescent and fluorescent lamps, distribution transformers, and electric motors.

³⁵ 10 CFR Chapter II, Part 430. For a summary of resulting standards, see http://www.eere.energy.gov/buildings/appliance_standards/residential_products.html.

³⁶ U.S. Department of State, *U.S. Climate Action Report 1997*, Washington, DC, July 1997, p. A-7.

³⁷ U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007, p. 55.

³⁸ Section 101, *Energy Policy Act of 1992*, P.L. 102-486. The section contains provisions for updating residential building codes; however, those provisions only require states to review any DOE determination with respect to updating codes. Adoption of the revisions is not mandatory.

³⁹ American Society of Heating, Refrigeration, and Air Conditioning Engineers.

⁴⁰ 67 *Federal Register* 46464 (July 15, 2002).

⁴¹ As of January 2007, 10 states had not updated their commercial building energy codes to comply with the EPACT 1992, according to the Building Codes Assistance Project. However, in three of those states, the codes have been adopted in some jurisdictions. See <http://www.bcap-energy.org>. The Energy Policy Act of 2005 requires a further update to the standards. An additional five states and the District of Columbia have yet to update their codes to the new requirement.

In announcing its July 2002 determination, the DOE focused on the energy savings that state adoption of the standard would entail, estimated at 130 million barrels of oil equivalent over 10 years.⁴² The DOE announcement does not mention any carbon dioxide reduction that could result from the improved energy efficiency. In the 2006 Climate Action Plan, DOE estimates that the new requirements will save 0.5 million metric tons of carbon dioxide in 2012, increasing to 3.1 million metric tons in 2020.⁴³

Corporate Average Fuel Economy (CAFE)

Federal fuel economy standards directly affect greenhouse gas emissions from the transportation sector. The Energy Policy and Conservation Act of 1975 (EPCA) established corporate average fuel economy (CAFE) standards for new passenger cars, and gave the Department of Transportation (DOT) the authority to set standards for other vehicles, including “light trucks,” which consist of pickups, vans, and sport utility vehicles.⁴⁴ The goal of EPCA was to reduce the dependence on foreign oil after the Arab oil embargo of the 1970s.

Increasing CAFE standards would lead to reductions in fuel consumption and greenhouse gas emissions as older, less efficient vehicles were replaced with more efficient models. However, concerns associated with increased CAFE standards include questions of occupant safety and vehicle choice. In 1994, the Clinton Administration considered raising the CAFE standard for light trucks. However, Congress included language in the annual FY1996-FY2001 DOT Appropriations Acts⁴⁵ prohibiting the use of appropriated funds for any rulemaking on CAFE, effectively freezing the standards. However, the Senate conferees on the FY2001 appropriations insisted upon a study of CAFE by the National Academy of Sciences (NAS). That study, released on July 30, 2001, concluded that it would be possible to achieve a more than 40% improvement in light truck fuel economy over a 10- to 15-year period at costs that would be recoverable over the lifetime of vehicle ownership, without compromising safety.

On April 7, 2003, DOT announced a final rule increasing light truck CAFE standards to 22.2 miles per gallon by model year 2007.⁴⁶ For the 2006 Climate Action Report, DOT estimated that in total, the regulations would save 42 million metric tons of carbon dioxide in 2012.⁴⁷

On April 6, 2006, DOT announced further changes to the light truck CAFE standards starting in model year 2008.⁴⁸ By model year 2011, all light truck manufacturers will be subject to new standards based on a vehicle’s size. DOT estimates that the new rule will save an additional 4.4 billion gallons of gasoline over the life of the vehicles produced between model years 2008 and 2011 (relative to the MY2007 standard). This would mean an additional greenhouse gas reduction of roughly 10 million to 12 million metric tons. Both rulemakings combined would lead to an estimated reduction of between 18 million and 22 million metric tons of greenhouse gases.

⁴² DOE, *Energy Department Determines that Model Commercial Building Code Will Save Energy & Benefit Consumer*, July 15, 2002. Available at http://www.energycodes.gov/implement/determinations_com_news.stm.

⁴³ U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007, p. 55.

⁴⁴ P.L. 94-163.

⁴⁵ P.L. 104-50 (FY1996), P.L. 104-205 (FY1997), P.L. 105-66 (FY1998), P.L. 105-277 (FY1999), P.L. 106-69 (FY2000), and P.L. 106-346 (FY2001).

⁴⁶ 68 *Federal Register* 16867-16900. April 7, 2003.

⁴⁷ U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007, p. 57.

⁴⁸ 71 *Federal Register* 17655-17679. April 6, 2006.

However, on November 15, 2007, the U.S. Court of Appeals for the Ninth Circuit remanded the MY2008 standards back to DOT because the agency did not explicitly value greenhouse gas reductions in its estimates of the costs and benefits of the rulemaking.⁴⁹

On December 19, 2007, President Bush signed the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140). Among other provisions, the new law requires a significant increase in combined passenger car/light truck fuel economy. By 2020, the combined new vehicle fleet must meet a combined CAFE average of 35 mpg, up from roughly 25 mpg in 2007. This fuel economy increase could lead to a significant reduction in greenhouse gas emissions from projected levels. In its Preliminary Regulatory Impact Analysis on proposed regulations for Model Years 2011-2015, DOT estimates that proposed rules for those years would save 521 million metric tons of CO₂ over the life of those vehicles.⁵⁰ The American Council for an Energy-Efficient Economy estimates that the new CAFE standards could save roughly 400 million metric tons per year and 3,800 million metric tons total by 2030.⁵¹ EISA is discussed in greater detail below.

Renewable Fuel Standard

The Energy Policy Act of 2005 established a renewable fuel standard (RFS) requiring the use of renewable fuels in gasoline. EISA further expanded this requirement, and for the first time set requirements for the lifecycle greenhouse gas emissions of motor fuels. For the 2006 Climate Action Report, EPA did not estimate emissions reductions from the program. However, it is likely that the program could lead to lower emissions, especially with the new requirements of EISA.

Distributed Energy Resources

A final program that the George W. Bush Administration describes as regulatory is the Distributed Energy Program at the Department of Energy. While most of the program is focused on R&D and commercialization of new technologies, the program also aims to eliminate regulatory barriers to the use of distributed energy. For all facets of the program, DOE estimates that the program saved 12.1 million metric tons of carbon dioxide in 2002, and will save 57 million metric tons in 2020.⁵²

Monitoring Rules—Carbon Dioxide Monitoring by Electric Generating Facilities

Section 821 of the 1990 Clean Air Act Amendments requires electric generating facilities affected by the acid rain provisions of Title IV to monitor carbon dioxide in accordance with Environmental Protection Agency (EPA) regulations.⁵³ This provision was enacted for the stated

⁴⁹ United States Court of Appeals, Ninth Circuit. *Center for Biological Diversity vs. National Highway Traffic Safety Administration*. Argued and Submitted August 14, 2007. Filed November 15, 2007.

⁵⁰ National Highway Traffic Safety Administration, *Preliminary Regulatory Impact Analysis: Corporate Average Fuel Economy for MY2011-2015 Passenger Cars and Light Trucks*, Washington, DC, April 2008, pp. III-17, http://www.nhtsa.gov/staticfiles/DOT/NHTSA/Rulemaking/Rules/Associated%20Files/CAFE_2008_PRIA.pdf.

⁵¹ American Council for an Energy-Efficient Economy, *Energy Bill Savings Estimates as Passed by the Senate*, Washington, DC, December 14, 2007, <http://www.aceee.org/energy/national/EnergyBillSavings12-14.pdf>.

⁵² U.S. Department of State, *U.S. Climate Action Report—2006*, Washington, DC, July 2007, p. 56.

⁵³ Section 821, *1990 Clean Air Act Amendments* (P.L. 101-549, 42 USC 7651k).

purpose of establishing a national carbon dioxide monitoring system.⁵⁴ As promulgated by EPA, regulations permit owners and operators of affected facilities to monitor their carbon dioxide emissions through either continuous emission monitoring (CEM) or fuel analysis.⁵⁵ The CEM regulations for carbon dioxide are similar to those for the acid rain program's sulfur dioxide CEM regulations. Those choosing fuel analysis must calculate mass emissions on a daily, quarterly, and annual basis, based on amounts and types of fuel used.

Although this regulation does not actually reduce carbon dioxide emissions, it does expressly target the global climate change issue. Also, it represents a necessary first step toward any future market-oriented greenhouse gas reduction program. Whether a market-oriented control program were to be based on tradable emissions credits or a carbon tax, accurate emissions data would be the foundation for developing the allocation systems, reduction targets, and enforcement provisions.

Regulatory Program Promoting Renewable Energy Through PURPA Eliminated by P.L. 109-58

The 1978 Public Utility Regulatory Policies Act (PURPA) is designed to encourage the development of cogeneration and small power production (called “qualifying facilities” or QFs).⁵⁶ In particular, Section 210 contained a mandatory purchase clause requiring utilities to buy power from QFs at the utilities’ avoided cost. PURPA exempted from the full breadth of federal and state regulation certain small power producers, including those using geothermal, solar, wind, and waste energy.⁵⁷ This regulatory exemption, along with the mandatory purchase requirement contained in Section 210, has proven to be a strong incentive for development of renewable energy, particularly biomass. QF renewable capacity represents a substantial majority of U.S. non-hydroelectric renewable energy capacity.⁵⁸ The Energy Policy Act of 2005 repealed the Section 210 purchase requirement for new contracts (see the section below on “The Energy Policy Act of 2005”).

PURPA was enacted to promote energy security through energy conservation and the development of alternative energy sources in the aftermath of the 1974 oil crisis. As events have unfolded, the effort to reduce dependence on fossil fuels has had the additional perceived benefit of reducing carbon dioxide emissions. In 1997, the Clinton Administration estimated that its renewable energy commercialization efforts with respect to biomass, geothermal, and wind would reduce greenhouse gas emissions by 17.6 million metric tons of carbon equivalent by the year 2010.⁵⁹ For the 2002 Climate Action Report, the George W. Bush Administration provided no specific estimate of reductions from the use of renewable electricity. However, for the general

⁵⁴ S.Rept. 101-952.

⁵⁵ See 40 CFR 75.13, along with appendix G (for CEMs specifications) and appendix F (for fuel analysis specifications).

⁵⁶ P.L. 95-617 (1978).

⁵⁷ As originally enacted, the law limited most small power producers to 30 MW, with geothermal energy limited to 80 MW. The Solar, Wind, Waste, and Geothermal Production Incentives Act of 1990 (P.L. 101-575) removed the size limitations.

⁵⁸ Energy Information Administration, *Renewable Energy 2000: Issues and Trends*, Washington, DC, February 2001, p. 10.

⁵⁹ U.S. Department of State, *U.S. Climate Action Report 1997*, Washington, DC, July 1997, pp. A-23, A-24, and A-27.

category of energy supply, the Administration estimated the year 2000 effect to have been a saving of 14.7 million metric tons of carbon dioxide equivalent.⁶⁰

With the passage of the Energy Policy Act of 2005, Section 210 was amended, subject to a FERC determination of market conditions. In October 2006, FERC adopted a final rule delineating those conditions, finding that utilities operating within regional transmission organizations (RTOs) met the conditions for repeal, while the market conditions for non-RTO utilities would be determined on a case-by-case basis.⁶¹

The Energy Policy Act of 2005

On August 8, 2005, President Bush signed the Energy Policy Act of 2005 (P.L. 109-58), with provisions directly and indirectly related to greenhouse gas emissions. Title XVI establishes a voluntary national program designed to encourage voluntary reductions in greenhouse gases. The effort is led by an Interagency Committee, with DOE playing a key supporting role. Title XVI attempts to support actions focused on reducing U.S. carbon intensity, but does not establish a requirement to reduce emissions. The title also establishes a program to encourage exports of carbon intensity-reducing technologies to developing countries. This program is led by the Secretary of State.

In addition to Title XVI, Section 1253 repeals the mandatory purchase requirement under Section 210 of PURPA for new contracts if FERC finds that a competitive electricity market exists and if other conditions are met.⁶² The debate over the bill included proposals to increase CAFE standards and to establish a renewable portfolio standard, although these changes were not included in the final law.

Also not included in P.L. 109-58 was Section 1612 of the Senate bill (H.R. 6, as amended by S.Amdt. 866), which expressed the Sense of the Senate that human activities are a substantial cause of greenhouse gas accumulation in the atmosphere, causing average temperatures to rise. Further, the resolution called for a mandatory, market-based program to limit greenhouse gas emissions. Also, a bill to establish a mandatory, market-based greenhouse gas reduction program (S. 1151) was debated on the Senate floor as S.Amdt. 826 and defeated by a 38-60 vote.

The Energy Independence and Security Act of 2007

On December 19, 2007, President Bush signed the Energy Independence and Security Act of 2007 (EISA, P.L. 110-140). EISA contains many energy provisions that could lead to reductions

⁶⁰ U.S. Department of State, *U.S. Climate Action Report 2002*, Washington, DC, May 2002, p. 65.

⁶¹ This determination represents only a preliminary, rebuttable, presumption that conditions have been met. Utilities are still required to file for relief from Section 210 requirements. For more information, see FERC docket RM06-10-000, October 19, 2006.

⁶² Proponents of renewable energy argued that repeal would reduce the role of renewables, while advocates of repeal argued that renewables no longer need economic intervention. For a more detailed discussion of PURPA, see CRS Report RL32728, *Electric Utility Regulatory Reform: Issues for the 109th Congress*, by Amy Abel.

in greenhouse gas emissions.⁶³ In addition to these indirect reductions, EISA also directly addresses climate change issues in several ways.

First, EISA expands the renewable fuel standard (RFS) established in P.L. 109-58. The RFS requires that a minimum amount of renewable fuels be blended into transportation fuels each year. The EISA amendments to the RFS significantly expand the mandated level. Further, they require that an increasing share of the RFS be met with “advanced biofuels” defined as having 50% lower lifecycle greenhouse gas emissions than petroleum fuels. This is the first time that Congress has enacted national policy addressing the carbon content of motor fuels.

Second, Title VII of the new law focuses on research, development, and demonstration of technologies to capture and store carbon dioxide. DOE research and development is expanded and will include large-scale demonstration projects. The Department of the Interior must develop a methodology to assess the national potential for geologic and ecosystem storage of carbon dioxide, and must recommend a regulatory framework for managing geologic carbon sequestration on public lands.

In addition to the above programs, EISA also requires the establishment of an Office of Climate Change and Environment in the Department of Transportation. This office will plan, coordinate, and implement research at DOT on reducing transportation-related energy use, mitigating the causes of climate change, and addressing the impacts of climate change on transportation.

Energy provisions not directly addressing climate change, but that could lead to lower greenhouse gas emissions, include

- more stringent fuel economy (CAFE) standards for passenger cars and light trucks;
- higher-efficiency standards for appliances and lighting;
- higher-efficiency requirements for government buildings; and
- research and development on renewable energy.

Conclusion

Energy policy was a key issue in the 110th Congress, as it was in earlier Congresses. High energy prices and international instability motivated passage of the 2005 Energy Policy Act and the 2007 Energy Independence and Security Act. Given that energy consumption is the dominant source of carbon dioxide emissions in this country, and a substantial source of overall greenhouse gas emissions, any reduction in energy consumption will likely lead to lower emissions. As indicated below (**Table 2**), energy-related activities are responsible for about 86% of the country’s greenhouse gas emissions, and 98% of its carbon dioxide emissions.

⁶³ For more information on EISA, see CRS Report RL34294, *Energy Independence and Security Act of 2007: A Summary of Major Provisions*, coordinated by Fred Sissine.

Table 2. 2005 Energy-Related Greenhouse Gas Emissions(million metric tons of CO₂ equivalent)

Greenhouse gas	Energy-related 2005 emissions	Total U.S. 2005 emissions	Energy as percent of total
Carbon Dioxide ^a	5,943	6,090	98%
Methane	206	539	38%
Nitrous Oxide	52	469	11%
HFC, PFC, SF ₆	13	163	8%
Totals ^b	6,215	7,260	86%

Source: Environmental Protection Agency, *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2005* April 2007

Note: Because carbon dioxide is by far the largest volume greenhouse gas, energy-related emissions are responsible for the majority of total greenhouse gas emissions.

- a. Biomass not included.
- b. Totals may not add due to independent rounding.

As noted in this report, climate change was an integral part of the debate on the 1992 Energy Policy Act (EPACT), occurring as it did during the signing and ratifying of the UNFCCC.⁶⁴ Indeed, EPACT became the implementing legislation for the UNFCCC, and, as discussed in this report, those programs are responsible for much of the reduced growth in greenhouse gases achieved since 1992. Most federal policies and regulations that have resulted in greenhouse gas reductions were, in fact, promulgated as energy policy initiatives. However, these policies have not reversed growth in overall U.S. emissions.

Climate change—as a specific issue needing a regulatory response—was debated during deliberations on the Energy Policy Act of 2005 (EPAct 2005) and recognized in passage of Senate Amendment 866 expressing the Sense of the Senate that Congress should enact a comprehensive and effective national program of mandatory, market-based limits and incentives on greenhouse gases that slow, stop, and reverse the growth of such emissions. The Energy Independence and Security Act (EISA) of 2007 directly addresses some climate change issues, but still generally focuses on energy supply and consumption. The overall effect of EPAct 2005 and EISA on future greenhouse gas emissions is unclear, and specific action on the issue will depend on efforts to enact the national program called for in Senate Amendment 866. An attempt to pass an economy-wide greenhouse gas cap-and-trade program in the Senate was unsuccessful in the 110th Congress.

While some provisions in energy laws enacted over the past 16 years have led to lower greenhouse gas emissions or addressed climate change directly, other provisions in those same laws have almost certainly resulted in higher emissions.⁶⁵ To date, no energy law has had reducing greenhouse gas emissions as the main organizing principle. Comprehensive climate change policy directed at reducing greenhouse gas emissions should address energy supply and consumption and, thus, be integrated with energy policy. This will be a pivotal challenge to the

⁶⁴ For more on the relationship between UNFCCC and EPACT, see CRS Report RL30024, *U.S. Global Climate Change Policy: Evolving Views on Cost, Competitiveness, and Comprehensiveness*, by Larry Parker and John Blodgett.

⁶⁵ These include provisions that promote additional production and/or use of fossil fuels.

111th Congress's and the incoming Administration's anticipated efforts to enact legislation to limit greenhouse gas emissions.

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