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Global Climate Change: The Role for Energy Efficiency

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Fred Sissine
Specialist in Energy Science, Technology, and Policy
Resources, Science, and Industry

ABSTRACT

Energy efficiency is seen as a key means to reduce fossil fuel-induced carbon dioxide (CO2) emissions that contribute to global climate change. This report reviews the role of energy efficiency in federal policies to curb CO2 emissions. In particular, it discusses targets for CO2 reductions, projected energy efficiency impacts, strategies for measuring impacts, and legislative proposals that would affect support for energy efficiency programs. This report will be updated as events warrant.

Global Climate Change: The Role for Energy Efficiency

Summary

Increased energy efficiency is generally thought to be the primary way to reduce the nation's growth in CO2 emissions. As result, it occupies a prominent role in proposals to curb future emissions. The Clinton Administration's 1993 Climate Change Action Plan (CCAP) sought to stabilize year 2000 emissions at the 1990 level. Global recognition that year 2000 stabilization would not be achieved led to the 1997 United Nations Framework Convention on Climate Change third conference of parties (COP-3) in Kyoto, Japan, where new emission reduction targets were proposed for 2008-2012. Subsequently, the Clinton Administration's Climate Change Technology Initiative (CCTI) proposed increased energy efficiency research and development spending, tax credits, and other policies to promote energy efficiency to curb emissions.

A debate has emerged over estimates of the potential for energy efficiency to further slow the growth of CO2 emissions. The Department of Energy issued a report by five national laboratories entitled *Scenarios of U.S. Carbon Reductions: Potential Impacts of Energy Technologies by 2010 and Beyond*. Also known as the *Five-Lab Study*, it projects that energy efficiency technology combined with a permit price of $50 per ton of carbon could bring 2010 emissions to a level just below the 1990 stabilization level. The *Five-Lab Study* projects that energy efficiency could account for 50% to 90% of the projected emissions reduction in 2010. This contribution would be achieved through an interaction between higher energy costs due to carbon permit prices that range up to $50/ton of carbon and a choice of response options that include substitution of lower carbon fuels and promotion of more energy efficient equipment.

However, the Energy Information Administration (EIA) issued a critique of the *Five-Lab Study* entitled *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*. EIA finds problems with key DOE assumptions about new energy-efficient technologies, which include "... increased performance and lower costs for new technologies, new [unspecified] government policies that promote adoption into the market, and a greater propensity by consumers to buy them than they have shown in the past." EIA further criticizes the *Five-Lab Study* for assuming an aggressive R&D program and a 1.9% annual economic growth rate, which is 10% lower than EIA's assumption of a 2.2% rate. Moreover, EIA says the *Five-Lab Study* end-use models likely include some double counting of emission reductions.

Also, there is a debate over the analysis of actual CO2 emission reductions from past energy efficiency measures. In this case, methodological issues are at the core of disagreements between the General Accounting Office (GAO) and the Environmental Protection Agency (EPA) about the best way to assess emission savings from EPA's various energy efficiency programs.

Federal efforts to curb global climate change through increased energy efficiency may be affected by a number of issues being debated by Congress, including program appropriations, new tax incentives, and legislation on electricity restructuring.

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Introduction

Energy efficiency is increased when an energy conversion device, such as a household appliance, automobile engine, or steam turbine, undergoes a technical change that enables it to provide the same service (lighting, heating, motor drive) while using less energy.[1] Energy efficiency is often viewed as a resource option like coal, oil or natural gas. It provides additional economic value by preserving the resource base and reducing pollution.

Energy security, a major driver of federal energy efficiency programs in the past, is now somewhat less of an issue. On the other hand, worldwide emphasis on environmental problems of air and water pollution and global climate change have emerged as important drivers of support for energy efficiency policies and programs. Also, energy efficiency is seen as a technology strategy to improve the competitiveness of U.S.-made appliances, cars, and other energy-using equipment in world markets. The Clinton Administration views energy efficiency as the flagship of its energy policy for global climate change and other environmental reasons.

From 1975 through 1985, high energy prices served as a strong catalyst to improved energy efficiency.[2] However, the sharp drop in oil and other energy prices that began in 1986 has dampened the impact of prices on energy efficiency improvements.

Federal policies and programs have also made a significant contribution to improved energy efficiency.[3] One such program is DOE's energy efficiency R&D program, which employs a "technology-push" strategy. That is, it produces new, ever-more efficient technologies that form a basis for new products and services in the private sector. In contrast, EPA's energy star programs employ a "market-pull" strategy wherein businesses, institutions, and consumers are encouraged to buy more energy-efficient equipment.

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[1] A more detailed definition of energy efficiency is available in CRS Issue Brief IB10020, *Energy Efficiency: Budget, Climate Change, and Electricity Restructuring Issues*.

[2] DOE. *Energy Conservation Trends: Understanding the Factors Affecting Energy Conservation Gains and Their Implications for Policy Development*. 1995. p. 2-3.

[3] Ibid.

The role of energy prices and the environmental benefits of energy efficiency often lead to a discussion about barriers and market failures. However, the resultant debate over the effectiveness of market forces to stimulate energy efficiency and the merit of federal policies and programs that support energy efficiency is not the focus of this report.[4] Instead, this paper is focused on the projected contribution of energy efficiency to reducing CO2 emissions

Energy efficiency is proposed as a cost-effective and reliable means for reducing the nation's growth in CO2 emissions due to fossil fuel use. Recognition of that potential has led to high expectations for the control of future CO2 emissions through even more energy efficiency improvements than have occurred through past programs, regulation, and price effects. Thus, in a recent context of low energy prices and rising fossil fuel use, the Clinton Administration has proposed increased government support for energy efficiency programs as its primary initiative to reduce emissions of CO2 and other "greenhouse gases"that may cause global climate change.

However, there is a debate over projected estimates of the future potential for energy efficiency to curb the growth of CO2 emissions through 2010. This paper discusses this debate, which is centered on differences between key reports by the Department of Energy (DOE) and the Energy Information Administration (EIA). A DOE report by five of its research laboratories projects that further gains in energy efficiency could be the largest future contributor to CO2 emissions reduction. However, EIA has criticized the DOE report's assumptions about the character of future energy efficiency measures, economic growth rates, future government R&D policies, and market adoption of energy efficiency measures.

The paper also describes a debate over the analysis of actual CO2 emission reductions from past energy efficiency measures. In this case, methodological issues are at the core of disagreements between the General Accounting Office (GAO) and the Environmental Protection Agency (EPA) about the best way to assess emission savings from EPA's various energy efficiency programs.

Finally, the paper notes that federal efforts to curb global climate change through increased energy efficiency may be affected by a number of issues being debated by Congress, including program appropriations, new tax incentives, and legislation on electricity restructuring.

Energy Use Impact on Global Climate Change

Wherever energy efficiency and conservation measures reduce fossil fuel use, they will reduce carbon dioxide (CO2) emissions, as well as pollutants that contribute to water pollution, acid rain, and urban smog. Human activities, particularly burning of fossil fuels, have increased atmospheric CO2 and other trace gases.[5] If these gases continue to accumulate in the atmosphere at current rates, many experts believe global

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[4] This topic is discussed in CRS Issue Brief IB10020, *Energy Efficiency: Budget, Climate Change, and Electricity Restructuring Issues.*

[5] The trace gases include chlorofluorocarbons (CFCs), methane, and nitrous oxide.

warming could occur through intensification of the natural "greenhouse effect," that otherwise moderates Earth's climate. Excess CO2 is the major contributor to this effect. The influence of human-induced emissions on the "greenhouse effect" is a subject of continuing research and controversy.[6]

U.S. use of fossil energy (coal, oil, natural gas) currently produces about one-fourth of the world's CO2 emissions. Since 1988, the federal government has accelerated programs that study the science of global climate change and created programs aimed at mitigating fossil fuel-generated carbon dioxide (CO2) and other human-generated emissions. The federal government has funded programs for energy efficiency as a CO2 mitigation measure at DOE, EPA, the Agency for International Development (AID), and the World Bank. The latter two agencies have received funding for energy efficiency-related climate actions through foreign operations appropriations bills.[7]

Efforts to study greenhouse gas emissions and to devise programs to reduce them accelerated after the 1992 United Nations Conference on Environment and Development (UNCED) concluded with the signing of the Rio Declaration, Agenda 21 (an action program), and the Framework Convention on Climate Change (UNFCCC). Agenda 21 promotes the development, transfer, and use of improved energy-efficient technologies, the application of economic and regulatory means that account for environmental and other social costs, and other energy efficiency-related measures. The United States ratified the UNFCCC in 1992, and the Convention entered into force in 1994. The UNFCCC calls for each nation to develop a strategy for emissions reduction, inventory emissions, and promotion of energy and other technologies that reduce emissions.

Energy Efficiency and Energy Use

Increased energy efficiency of combustion and other fuel-using equipment has a long record of reducing the rate of growth in fossil fuel use and, thereby, reducing carbon emissions. This improvement is reflected in the ratio of U.S. energy use to Gross Domestic Product (GDP), which fell from 19,750 British thermal units (Btu's) per dollar in 1971 to14,040 Btu's per dollar in 1986.[8] This represents an average annual reduction of 1.81% in the energy/GDP ratio. For the period from 1972 to 1986, energy efficiency improvements cut energy use by 30% or 32 quadrillion Btu's per year.[9] By 1988, recognition of this accomplishment had led to a focus on energy efficiency programs as a key strategy for future control of CO2 emissions.

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[6] For more on the science of climate change, see CRS Issue Brief 89005, *Global Climate Change*, by Wayne Morrisey and John Justus.

[7] For more on the foreign operations spending, see CRS Report 97-1015 F. *Global Climate Change: The Role of U.S. Foreign Assistance*, by Curt Tarnoff.

[8] U.S. DOE. EIA. *Annual Energy Review 1998.* July 1999. p. 12-13. Values are expressed in 1992 constant dollars.

[9] U.S. DOE. *Energy Conservation Trends*. 1989. p. 5. [DOE/PE-0092]

However, from1986 to 1998, the rate of energy efficiency improvement slowed. The energy/GDP ratio declined from 14,040 Btu's per dollar in 1986 to 12,480 Btu's per dollar in 1998, but this represents an average annual reduction of 0.85%, which is less than half the rate for 1972 to 1986. Further, the decline in oil prices since the mid-1980s has led to historically low gasoline prices which, in turn, encouraged motorists to buy less fuel-efficient automobiles, such as sport utility vehicles, and to increase travel by about 24%.[10] Overall, national petroleum use for transportation grew 21%, or 4.3 Q during this period. Also, since 1994, electric utility industry restructuring at the state level caused utility spending for energy efficiency to fall 48% by 1998 and the resultant rate of energy savings fell 20% from 1996 to 1998.[11] Meanwhile, coal use for electricity production grew 33% from 1986 to 1998.[12]

Thus, despite the increase in efficiency as measured by Btu/$, total fossil fuel use, has been rising steadily due to low energy prices, economic growth, and population growth. This growth includes oil and coal, which are the most intense emitters of carbon dioxide (CO2). As a result, CO2 emissions have been rising, eclipsing the 1993 Clinton Administration Climate Change Action Plan (CCAP) goal of reducing emissions to the 1990 level by 2000. In fact, Energy Information Administration (EIA) projections show fossil energy use and emissions increases continuing through 2010.[13]

Carbon Emissions Reduction and Energy Efficiency

Climate Change Action Plan (CCAP)

In 1993, the Clinton Administration launched a Climate Change Action Plan (CCAP) that sought to stabilize year 2000 CO2 emissions at the 1990 level of 1,346 million metric tons of carbon (MMTC). To achieve this goal, the plan relied primarily on voluntary measures for increasing energy efficiency. A variety of CCAP programs were funded at DOE, EPA, and other agencies, but at levels well below budget requests. The nation clearly did not reach the year 2000 stabilization goal. Instead, emissions rose to 1,485 MMTC in 1998 and are projected to reach 1,552 MMTC in 2000, which would be a 206 MMTC, or 15%, increase above the 1990 level.

Kyoto Protocol's Target for 2010

By 1995, growing worldwide recognition of the difficulty in reaching year 2000 stabilization led to meetings of the conference of parties to the UNFCCC to set enforceable targets for emission reductions for the post-2000 period. This effort culminated in December 1997, where the third conference of parties (COP-3) met in Kyoto, Japan, to set years 2008-2012 targets for emission reductions.

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[10] EIA. *Monthly Energy Review*. December 1999. Table1.10. p. 17.

[11] EIA. *Electric Power Annual 1998 Volume II.* December 1999. Table 44. p. 75.

[12] EIA, *Monthly Energy Review*, Table 6.2, p. 88.

[13] DOE. EIA. Annual Energy Outlook (AEO) 2000. Reference Case Forecast. Table A19. p. 141.

The 1997 Kyoto Protocol calls for: (1) the United States to reduce by 7% from baseline years (1990 for CO2) the average annual tons of carbon equivalent released by six greenhouse gases during the period 2008 to 2012; (2) implementation through market mechanisms such as international joint implementation and emissions trading schemes; and (3) encouragement of "clean energy" development in developing countries. However, critics maintain that the Protocol does not require developing nations to "meaningfully participate" in the emission reduction effort. This is a major barrier to Administration goals and Senate ratification and that is fostering additional negotiations before the Administration will seek Senate ratification of the Protocol.[14]

Inventories of CO2 emissions are fairly well established and account for about 85% of the total carbon-equivalent emissions from all six greenhouse gases. In addition to using energy efficiency and other means to curb CO2 emissions from energy production, CO2 can be sequestered through re-forestation and other carbon "sinks." Due to the way sinks are counted, and due to other provisions in the Protocol, the actual reduction of U.S. greenhouse emissions required to meet the Kyoto target may be less than 7% below the 1990 CO2 baseline. The uncertainties about sinks, and larger uncertainties about future economic growth rates and other variables, create a broad range of uncertainty about the projected average level of emissions over the 2008-2012 period. For example, two major studies yielded a range from about 390 MMTC to 660 MMTC as the projected emission reduction requirement needed to achieve the U.S. goal. This represents a 70% range of uncertainty in the emissions reduction task. Given the previous failure of the 1993 CCAP to stabilize emissions by 2000, the current Kyoto target for actually reducing emissions in the 2008-2012 time frame looms as a major policy challenge, assuming Senate ratification of the Kyoto Protocol.[15]

The Kyoto Agreement set 1990 as the baseline year for CO2 emissions, from which progress toward targets for future reductions are to be measured. DOE's Energy Information Administration (EIA) is the recognized authority for assessing actual levels, and projecting baseline "business-as-usual" (BAU) future levels, for CO2 and all other U.S. greenhouse gas emissions. EIA has established the 1990 CO2 level at 1,346 MMTC. EIA's Annual Energy Outlook (AEO) projects future CO2 levels. Assuming no major future policy actions, the BAU scenario in the AEO projects a large growth in CO2 emissions by 2010. However, in accounting for recent policy changes and projected economic trends, the AEO's projections vary considerably from year-to-year. The projected BAU level for CO2 in 2010 stood at 1,730 MMTC in the 1997 AEO, 1,803 MMTC in the 1998 AEO, 1,791 MMTC in the 1999 AEO, and 1,787 in the 2000 AEO. Thus, for example, the 1997 projection for 2010 would be a 384 MMTC increase over the 1990 level. The 2000 projection for 2010 would be a 441 MMTC, or 33%, increase over the 1990 level.

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[14] For more details about the Kyoto Protocol, see the CRS electronic briefing book on Global Climate Change at [http://www.congress.gov/brbk/html/ebgcctop.html].

[15] For more on the other greenhouse gases and Kyoto reduction targets, see CRS Report 98-235, *Global Climate Change: Reducing Greenhouse Gases — How Much and From What Baseline?*, by Larry Parker and John Blodgett.

Energy Efficiency Impacts Projected for 2010

Because CO2 contributes the largest share of greenhouse gas emission impact, it has been the focus of studies of the potential for reducing emissions through energy efficiency and other means. In preparation for the meeting of the Third Conference of Parties (COP-3) to the UNFCCC held in Kyoto, DOE's Office of Energy Efficiency and Renewable Energy (EERE) issued a September 1997 report by five national laboratories entitled *Scenarios of U.S. Carbon Reductions: Potential Impacts of Energy Technologies by 2010 and Beyond*.[16] Also, known as the *Five-Lab Study*, it assumed the 1990 baseline of 1,346 MMTC and used the 1997 BAU projection that emissions would reach 1,730 MMTC in 2010 — an increase of about 384 MMTC, or 29%. This is shown in Table 1. The report analyzes some options for using cost-effective high-efficiency (HE) energy technologies and other low-carbon (LC) technology options to curb emissions. It projects that a combination of HE/LC technology and a permit price of $50 per ton of carbon could bring 2010 emissions to a level just below the 1990 stabilization level. Lower permit price assumptions yielded 2010 emission levels between the BAU and stabilization levels.

The *Five-Lab Study* anticipates, as Table 2 shows, that energy efficiency is the single largest contributor to meeting U.S. CO2 targets, accounting for 50% to 90% of the projected emissions reduction in 2010. The transportation sector yields the most reduction; from automobile weight reduction, fuel cell breakthroughs, and other options. The buildings sector yields reductions from lighting, space conditioning, and other options. The industry sector yields savings from combined heat and power (CHP), motor system design, and a variety of technologies specific to each industry, such as impulse drying for pulp and paper plants and direct smelting for iron and steel plants. In the utility sector, some savings come from improved power plant efficiency, but the largest contribution is from carbon permit prices stimulating the use of low carbon fuels. Further, the *Five-Lab Study* projects that all emission-reduction scenarios can be achieved at low or no net direct cost to the economy.

In a 1998 report, *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*, EIA finds problems with several key assumptions in the *Five-Lab Study* about the use of new energy-efficient technologies to reduce emissions. These assumptions include "... increased performance and lower costs for new technologies, new [unspecified] government policies that promote adoption into the market, and a greater propensity by consumers to buy them than they have shown in the past." Specific examples include use of a 15-year payback for buildings technology when consumers expect one-year to five-year paybacks; use of a 6% industrial market penetration factor in an EIA model that normally assumes 3%; and use of 50 mpg for new car fuel economy while EIA estimates about 33 mpg.

EIA further criticizes the *Five-Lab Study* for assuming an aggressive R&D program and a 1.9% annual economic growth rate, which is 10% lower than EIA's assumption of a 2.2% rate. Moreover, EIA says the *Five-Lab Study* uses a series of independent, non-integrated, end-use models that fail to capture feedback between

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[16] Available at [http://www.ornl.gov/ORNL/Energy_Eff/labweb.htm].

energy markets and the rest of the economy and likely includes some double counting of emission reduction benefits. Additionally, EIA notes that none of the scenarios in the *Five-Lab Study* yields emissions below the 1990 level, because they were designed to achieve stabilization at 1990 levels. In contrast to the *Five-Lab Study*, EIA's equivalent scenario (see Table 1, scenario for "1990+9%") finds that a higher carbon price of $163 per MMTC would be required and that the Gross Domestic Product (GDP) would be about 2% , or $235 billion (in year 2000 constant dollars), lower.

Climate Change Technology Initiative (CCTI)

As it became clear that the CCAP would fall short of its goal of stabilizing emissions by 2000 and as the Kyoto Protocol set an updated round of goals to reduce emissions further by 2008-2012, the Clinton Administration responded by issuing its Climate Change Technology Initiative (CCTI) proposals for increased energy efficiency research and development (R&D) spending, tax credits, and other policy mechanisms at the Department of Energy, Environmental Protection Agency, and other agencies.[17] [18] EPA and DOE have stressed the urgency of action, contending that CCTI provisions would provide immediate savings in energy, costs, and emissions. In contrast, DOE's Energy Information Administration has contended that the CCTI provisions would provide a minimal impact on emissions. Congress has approved only small amounts of the CCTI requests and has expressed concerns about approving the Kyoto Protocol, which would set a national target for emission reductions through 2012.

See also CRS Issue Brief IB10020 on *Energy Efficiency*[19] and CRS Electronic Briefing Book on *Global Climate Change* at [http://www.congress.gov/brbk/html/ebgcc1.html]

Measuring Energy Efficiency Impacts

Important issues relate to measuring or otherwise verifying a reduction of emissions from past or projected future levels.

Studies show that energy efficiency measures have slowed fossil energy demand and provided real reductions in CO2 emissions compared to projected growth rates. There is a growing professional literature on the assessment of energy efficiency program impacts, which forms a basis for assessing their effect on emissions.[20] One

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[17] For more on the R&D proposals, see CRS Report 98-408 STM. *Global Climate Change: Research and Development Provisions in the President's Climate Change Technology Initiative*, by Michael Simpson.

[18] For more on the tax proposals, see CRS Report 98-193 E. *Global Climate Change: The Energy Tax Incentives in the President's FY2000 Budget*, by Salvatore Lazzari.

[19] Available at [http://www.congress.gov/cgi-lis/web_evaluate]

[20] International Energy Program Evaluation Conference. *Evaluation in Transition: Working in a Competitive Energy Industry Environment*. Proceedings. 1999. 968 p.

key study is DOE's report Energy Conservation Trends,[21] which presents the most complete analysis available on the achievements of DOE energy efficiency policies. EIA has also begun to examine the analytical basis for verifying the achievements of energy efficiency.[22]

However, many of these same studies show that long range energy savings result from a diverse array of measures whose savings are not easily disentangled from the impacts of energy prices, consumer behavior, and other variables. As a result, claims to achieving a certain amount of saving may be subjected to dispute. For example, GAO and EPA disagree about the methods used (and the resulting savings estimates) for assessing emission reductions due to EPA's CCAP energy efficiency programs.[23]

According to EPA, the Administration evaluates the effectiveness of its climate programs through an interagency program review. The first such interagency evaluation, chaired by the White House Council on Environmental Quality, examined the emissions impact of CCAP. The results were published in the U.S. Climate Action Report 1997, as part of the U.S. submission to the UNFCCC.[24] The GAO reviewed estimates of the emission-reduction impacts for four of 20 EPA voluntary programs under CCAP.[25] For two of the four programs, GAO found that EPA did not adjust emission reduction estimates to account for non-program factors that may have contributed to the reported results.[26] This critique has led to an ongoing debate between GAO and EPA over methods of measuring program impacts and the reliability and validity of reported emission reduction estimates.[27] [28]

There are a number of energy efficiency measurement issues. First, is which indicators should be used to assess progress in energy efficiency? Energy use per unit of gross domestic product (GDP) is one popular measure. However, energy use per

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[21] DOE. *Energy Conservation Trends: Understanding the Factors Affecting Energy Conservation Gains and Their Implications for Policy Development*. 1995. 50 p.

[22] Energy Information Administration. *Measuring Energy Efficiency in the United States' Economy: A Beginning*. (DOE/EIA-0555[95]/2) October 1995. 91 p.

[23] U.S. Environmental Protection Agency. *Energy Star and Related Programs 1997 Annual Report.* March 1998. (430-R-98-002) 37 p.

[24] U.S. Department of State. Office of Global Change. *Climate Action Report*. 1997. p. 79-82.

[25] U.S. GAO. *Global Warming: Information on the Results of Four of EPA's Voluntary Climate Change Programs*. 1997. p. 26. [GAO/RCED-97-163] GAO notes that the four programs – Green Lights, Source Reduction and Recycling, Coalbed Methane Outreach, and State and Local Outreach – represented about one-third of EPA's CCAP funding and about one-third of the estimated emission reductions for year 2000.

[26] Ibid, p. 2. The two programs are Green Lights and State and Local Programs.

[27] U.S. Congress. Senate. Committee on Energy and Natural Resources. Hearing. *GAO's Review of the Administration's Climate Change Proposal*. June 4, 1998.

[28] U.S. EPA. Climate Protection Division. *Driving Investment in Energy Efficiency: Energy Star and Other Voluntary Programs.* [EPA 430-R-99-005] July 1999. 35 p. Reports on EPA's latest estimates of emission reductions from its energy efficiency programs.

person is another very informative measure. Also, there are cause and effect questions that are difficult to assess and could be masked by the very general energy/GDP ratio and energy/person ratio. For example, are improvements to such ratios due directly to energy efficiency R&D, energy efficiency programs and policies, energy prices, productivity enhancements, or consumer behavior? Also, there are a variety of methods that can be applied to seek answers to these questions. They include simulation models, econometric models, program impact evaluations, and others.

An effort is underway to create an international standard for measuring savings from energy efficiency. DOE and other agencies collaborated to create the International Performance Measurement and Verification Protocol (IPMVP).[29] Its purpose is to provide a common technical language for assessing the impact of energy efficiency and other measures on CO2 emissions. More specifically, it seeks to (1) increase the reliability of data for estimating emission reductions, (2) provide real-time data so the mid-course corrections can be made, (3) introduce consistency and transparency across project types and reporters, and (4) enhance the credibility of the projects with stakeholders.[30]

Legislative Proposals

In the 106th Congress, three types of legislation have been introduced that would support or otherwise affect the capacity for energy efficiency measures to curb global climate change. One category is direct appropriations for energy efficiency programs at DOE, EPA, and other agencies, which determine the range and magnitude of research, development, and implementation activities. The Clinton Administration's CCTI has sought major increases in spending for these energy efficiency programs as a strategy for curbing climate change. For FY2000, the appropriations for DOE energy efficiency programs (P.L. 106-113) supported some of the CCTI-requested increases. However, the appropriations for EPA energy efficiency programs (P.L. 106-74) did not fund any of the Administration's CCTI-requested increases.

A second category of legislation addresses the role of energy efficiency in curbing climate change by providing tax incentives for energy efficiency measures.[31] This category has included tax credits for homes, cars, and equipment that meet energy efficiency standards.

A third category of legislation focuses on policies to incorporate energy efficiency provisions in proposals to restructure the electric power industry. Since 1994, the emergence of state policies for electricity restructuring has dampened state

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[29] For more information, go to the website at http://www.ipmvp.org/.

[30] Vine, Edward and Sathaye, Jayant. The Impact of Climate Change on the Conduct of Evaluation: The Establishment of New Evaluation Guidelines. In International Energy Program Evaluation Conference. *Evaluation in Transition: Working in a Competitive Industry Environment*. Ninth International Conference. Evanston, IL, August 1999. p. 435-446.

[31] The Clinton Administration's CCTI included tax incentives for energy efficiency.

and utility energy efficiency programs.[32] Some voice concern that a federal policy to restructure the electric industry could further cut back energy efficiency and other "clean" energy programs. However, some states' restructuring policies incorporate a public benefits fund (PBF) or other policy mechanisms to support energy efficiency. Recognizing this concern, some federal electricity restructuring bills have included provisions to support energy efficiency, including the creation of a PBF to support energy efficiency, a tax credit for combined heat and power (CHP) facilities, and other measures.

For more information about specific bills, see CRS Issue Brief IB10020 on *Energy Efficiency*.

[32] In particular, as the number of state restructuring policy proposals grew from 1995 through 1998, utility funding for demand-side management programs dropped sharply.

Table 1. Projected Energy Efficiency Contribution to Year 2010 Carbon Reduction Target
(MMTC, million metric tons of carbon)

A. Include carbon sinks: 3% reduction from 1990 level					**Change Relative to BAU**		**Change Relative to 1990**		**% of Kyoto Goal**
		1990 Base	**2010 BAU**	**2010 Policy**	**MM TC**	**%**	**MM TC**	**%**	**%**
Five-Lab*	**2010 BAU**	1346	1730	1730	— —-	——-	384	29%	——-
	2010a	1346	1730	1604	126	7%	258	19%	30%
	2010b	1346	1730	1496	234	14%	150	11%	55%
	2010c	1346	1730	1336	394	23%	-10	-1%	93%
Kyoto (sinks)	——-	1346	1730	1306	424	25%	-40	-3%	100%
EIA#	**2010 BAU**	1346	1791	——-	— —-	——-	445	33%	——-
	2010	1346	1791	1466	325	18%	120	9%	67%
Kyoto (sinks)	——-	1346	1791	1306	485	27%	-40	-3%	100%
B. No carbon sinks: 7% reduction from 1990 level									
Five-Lab*	**2010 BAU**	1346	1730	1730	— —-	——-	384	29%	——-
	2010a	1346	1730	1604	126	7%	258	19%	26%
	2010b	1346	1730	1496	234	14%	150	11%	49%
	2010c	1346	1730	1336	394	23%	-10	-1%	82%
Kyoto (w/o sinks)	——-	1346	1730	1252	478	28%	-94	-7%	100%
EIA	**2010 BAU**	1346	1791	——-	— —-	——-	445	33%	——-
	2010	1346	1791	1466	325	18%	147	9%	56%
Kyoto (w/o sinks)	——-	1346	1791	1252	539	30%	-94	-7%	100%
* *Five-Lab Study* Scenarios (p. 1.14): (a) “energy efficiency,” (b) high energy and low carbon, permit price = $25/ton carbon (HE/LC $25), (c) high energy and low carbon, permit price = $50/ton carbon (HE/LC $50).									
# *Impacts of Kyoto Protocol* Scenario 1990+9% (p. 146-150).									

Source: DOE, *Scenarios of U.S. Carbon Reductions*, p. 1.12-1.14; DOE Energy Information Administration (EIA). *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity.* October 1998. p. 120-122, 146-150.

Table 2. DOE Five-Lab Study:
Potential Carbon Reductions from Energy Efficiency in 2010
(million metric tons of carbon, MMTC)

Sector	**Scenario**			
	1997 AEO BAU	Efficiency	HE/LC $25	HE/LC $50
Efficiency				
Buildings	—-	25	42	59
Industry	—-	28	44	62
Transportation	—-	61	74	87
Total, Efficiency	**—-**	**114**	**160**	**208**
Other	—-	12	74	186
Grand Total	**—-**	**126**	**234**	**394**
Net Emissions	1,730	1,604	1,496	1,336
Reduction below 1997 AEO business-as-usual (BAU)	0%	7%	14%	23%

Source: DOE, Scenarios of U.S. Carbon Reductions, Table 1.4, p. 1.12.