

June 1997

GLOBAL WARMING

Information on the Results of Four of EPA's Voluntary Climate Change Programs



**Resources, Community, and
Economic Development Division**

B-276994

June 30, 1997

The Honorable Christopher S. Bond
Chairman, Subcommittee on VA, HUD,
and Independent Agencies
Committee on Appropriations
United States Senate

The Honorable Jerry Lewis
Chairman, Subcommittee on VA, HUD,
and Independent Agencies
Committee on Appropriations
House of Representatives

Increasing emissions of carbon dioxide, methane, and other heat-trapping greenhouse gases generated by human activity are believed to contribute to global warming. In an effort to reduce greenhouse gas emissions, the United States issued its Climate Change Action Plan (CCAP) in October 1993. The plan was designed to reduce greenhouse gas emissions primarily through voluntary efforts by companies, state and local governments, and other organizations. The Environmental Protection Agency (EPA) is responsible for 20 CCAP programs. The Department of Energy and other federal agencies are responsible for other CCAP programs.

Because of your concerns about the effectiveness of the climate change programs, you asked us to determine (1) what EPA has done to ensure that the greenhouse gas reductions it reports reflect only the results of its efforts, as opposed to other factors, and (2) whether EPA's projected reductions are consistent with experience to date. As agreed with your offices, we focused our review on four CCAP programs, which are designed to reduce emissions of various greenhouse gases through work with different kinds of organizations. These four programs account for about one-third of EPA's funding for CCAP.

Specifically, the Green Lights Program primarily encourages businesses and other organizations to install energy-efficient lighting in their buildings in order to reduce the use of electricity and the emission of carbon dioxide produced by generating electricity. The Coalbed Methane Outreach Program encourages coal mining companies to capture and use, as an energy source, methane that would otherwise be vented to the atmosphere. To reduce greenhouse gas emissions from manufacturing,

transporting, and disposing of materials, the Source Reduction and Recycling Program encourages businesses to reduce the amount of solid waste they generate and to increase the amount of waste they recycle. The State and Local Outreach Program helps state and local governments understand the sources of and possible solutions to global warming and also supports selected demonstration projects.

Results in Brief

For two of the four CCAP programs we reviewed, EPA adjusted the reductions in greenhouse gas emissions it had reported to account only for the effects of its efforts; for the other two programs, it did not adjust the reported reductions. Specifically, for the Coalbed Methane Outreach and Source Reduction and Recycling programs, EPA determined that nonprogram factors accounted for some of the reported reductions and, therefore, adjusted those reductions. For the Green Lights Program, EPA officials said that some reported reductions were probably the result of nonprogram factors, but they did not attempt to quantify the extent of the nonprogram factors because they believe it is not possible to do so. They said that any reductions resulting from nonprogram factors would likely be counterbalanced by reductions that they believe are attributable to the program but were not reported to EPA because the organizations did not participate in the program. Finally, for the State and Local Outreach Program, EPA did not attempt to determine whether some of the reported reductions resulted from nonprogram factors, although program officials said they tried to eliminate double-counting where reductions might be the result of other CCAP programs. EPA officials said they limited their efforts to quantify how much of the reported reductions resulted only from the effects of EPA's programs because it is difficult to make such an assessment, especially in the early stages of the programs' development.

EPA's projections of future reductions in greenhouse gases are not consistent with experience to date for three of the four programs but are consistent for the fourth program. For the Green Lights and Source Reduction and Recycling programs, the projected reductions are based on an assumption that the participants will, respectively, upgrade a larger proportion of their space and reduce waste at the source more in the future than they have thus far. For the State and Local Outreach Program, the projections assume that one key project will increase its impact, even though there are questions about the basis for the reductions reported thus far. Finally, for the Coalbed Methane Outreach Program, the projected reductions are consistent with experience to date.

Background

According to the Intergovernmental Panel on Climate Change, climate models project an increase in the earth's average surface temperature of between about two and six degrees Fahrenheit in the next century as a result of increasing emissions of greenhouse gases.¹ Furthermore, the panel reported in 1995, such increases could lead to floods, droughts, and other harmful changes in ecosystems. To address concerns about the possibility of global climate change, in May 1992 the United States and other countries signed the United Nations Framework Convention on Climate Change. As part of the Convention, the United States and other developed countries agreed to establish policies and measures with the aim of returning their greenhouse gas emissions to 1990 levels by 2000. In fulfilling its obligations under the Convention, the United States developed CCAP, whose goal is to reduce emissions by 109 million metric tons of carbon equivalent (MMTCE), from the projected 2000 level of 1,568 MMTCE to 1,459 MMTCE, slightly below the 1990 emissions level.²

EPA's 20 CCAP programs are generally designed to provide the information and tools to encourage the participants to voluntarily undertake changes that will reduce emissions of greenhouse gases whenever the changes make economic sense. Also, some programs are designed to overcome the institutional barriers that have traditionally prevented organizations from taking action.³ The Congress appropriated about \$86 million for EPA's CCAP programs for fiscal year 1997; EPA requested \$149 million for these programs in fiscal year 1998.

For this review, we selected four programs because (1) they are involved with different greenhouse gases and different kinds of organizations, (2) each accounts for a substantial proportion of EPA's CCAP funding, and

¹The panel was established in 1988 by the United Nations Environment Programme and the World Meteorological Organization to assess scientific and technical information about climatic change. See Working Group II Second Assessment Report: Summary for Policymakers: Impacts, Adaptation and Mitigation Options, Intergovernmental Panel on Climate Change, Working Group II, Technical Support Unit, Oct. 20, 1995. For additional information on the issue of global warming, see Global Warming: Difficulties Assessing Countries' Progress Stabilizing Emissions of Greenhouse Gases (GAO/RCED-96-188, Sept. 4, 1996).

²Greenhouse gases have varied effects on the atmosphere as measured by their global warming potentials. These global warming potentials are applied to emissions to arrive at a common measure for the greenhouse gases; the measure is expressed in million metric tons of carbon equivalent.

³According to a 1992 report by the Office of Technology Assessment, there are several reasons why energy-efficient technologies are not used more often in buildings. These reasons include the following: (1) There is often a separation between those who purchase energy-using equipment (for example, building owners) and those who pay to operate the equipment (building tenants). (2) Because energy costs are relatively low in comparison to total operating costs, those concerned with cost reduction often focus elsewhere. (3) Energy efficiency is often misperceived as requiring discomfort or sacrifice, limiting its appeal. See Building Energy Efficiency, ch. 3, Office of Technology Assessment (OTA-E-518, May 1992).

(3) each is credited by EPA as substantially reducing greenhouse gas emissions. Appendix I provides funding levels, the number of participants, and other information about each program.

The Green Lights Program is designed to encourage organizations to voluntarily adopt energy-efficient lighting technologies, such as compact fluorescent light bulbs and electronic ballasts. EPA provides information intended to encourage the adoption of these technologies. The Source Reduction and Recycling Program is designed to reduce the volume of solid waste produced and sent to landfills. Under the program's WasteWise element,⁴ EPA signs up businesses that agree to voluntarily decrease the amount of waste they generate and to increase the amount of waste they recycle. Under the program's Unit-Based Pricing element, local communities agree to charge residents for waste disposal on the basis of the amount of waste they generate.

The Coalbed Methane Outreach Program is designed to encourage coal mines and related industries to recover and use methane that would otherwise be emitted. The State and Local Outreach Program is a foundation program, designed primarily to raise awareness about climate change and provide technical support to state and local agencies and nonprofit organizations in analyzing and developing cost-effective response strategies, not to achieve short-term reductions in greenhouse gas emissions. The program also funds demonstration projects designed to test innovative strategies for reducing emissions and examine the impact of climate change on the states.

EPA establishes annual program targets for the programs, such as the volume of reductions in greenhouse gases (except for foundation programs, as noted above) and the number of participants. It tracks progress against these targets, relying primarily on reports from the programs' participants. However, EPA does not independently verify these reported reductions.

⁴EPA refers to it as WasteWiSe.

Greenhouse Gas Reductions Reported by EPA Are Not Limited to Program Effects in Two of the Four CCAP Programs We Examined

Efforts to improve energy efficiency, increase recycling, and achieve related goals have been under way for years. These long-standing efforts make it difficult to measure the programs' "net" reductions—those that result only from CCAP programs—as compared with total, or "gross," reductions—those that result from CCAP programs as well as from other, nonprogram factors. EPA officials told us that measuring the net reductions that are strictly due to the results of CCAP efforts is difficult.⁵

Green Lights Program

According to EPA, 2,308 organizations were participating in the Green Lights Program as of February 1997. These organizations committed to upgrade the lighting in 6 billion square feet of floorspace, about 9 percent of the national total, according to EPA. Through fiscal year 1996, Green Lights participants reported upgrading the lighting in 1.3 billion square feet of floorspace, resulting in greenhouse gas reductions of 0.6 MMTCE. Although some of the reported reductions may be the result of influences from outside of the Green Lights Program, EPA did not attempt to measure the program's "net" benefits. Officials said that they believed that any reductions that resulted from other factors were likely offset by the reductions achieved by the nonparticipating organizations that were influenced by the program but not reported to EPA.

According to the representatives of seven former participants we spoke with, the program had a positive impact on these organizations' efforts to achieve energy savings from lighting technology. When we interviewed officials at these organizations that had completed their participation in the Green Lights Program, representatives of all seven said that they were pleased with the program. For example, some representatives said that they viewed the data provided by EPA on the benefits of specific lighting technologies as being valuable and objective.

The reductions reported by EPA could be overstated if some Green Lights participants undertook at least some of their lighting upgrades because of nonprogram factors. Four factors suggest that some upgrades were made because of nonprogram factors.

First, according to a 1992 survey of commercial buildings, a substantial amount of floorspace was upgraded before the Green Lights Program was

⁵According to EPA officials, in a forthcoming report the administration will provide information on its estimates of the net greenhouse gas reductions resulting from the climate change programs. The report is scheduled to be issued in July 1997.

well established. The national survey of commercial buildings was conducted by the Department of Energy's Energy Information Administration (EIA).⁶ The survey found that 43 percent of commercial floorspace had lighting conservation features (such as occupancy sensors and time clocks) and that 22 percent of the floorspace had undergone an energy audit (which can identify opportunities for saving energy) in the previous 5 years.

Second, financial incentives that were available during the early to mid-1990s may have induced some organizations to install energy-efficient lighting. Officials of the Edison Electric Institute, an electric utility trade group, estimated that 80 to 90 percent of its members offered financial incentives during that time period to encourage their customers to install more energy-efficient lighting. By offsetting some of the costs of lighting upgrades, such assistance provides an incentive to adopt energy-efficient lighting. In fact, Green Lights participants reported to EPA that they had received \$143 million in such rebates through fiscal year 1996.

Third, some of the reductions attributed to the Green Lights Program were achieved by companies involved with lighting products, which could be expected to install energy-efficient lighting without the program. Of the 2,308 Green Lights participants, 593, or about one-quarter, were classified as "allies," that is, companies that manufacture, sell, and install lighting products. The reductions reported by these companies account for about 6 percent of the program's total. However, such companies could be expected to install energy-efficient lighting even without the Green Lights Program, given their knowledge of the benefits of this technology.

Finally, most of the representatives of organizations we spoke with about lighting upgrades, some of whom had participated and others who had not, told us that they would likely have made some of the upgrades without the program. When we spoke with the representatives of seven organizations that had completed their affiliation with the program, five of the seven stated that they would have done some or all of the upgrades without the program; the other two stated that they would not have done the upgrades without the program. In addition, we spoke with representatives of two major national corporations that did not participate in the program. Both companies told us that they had undertaken major lighting upgrades in the past few years without EPA's assistance.

⁶This survey was conducted shortly after the Green Lights Program was implemented. See *Commercial Building Characteristics 1992*, pp. 9-16, Energy Information Administration (DOE/EIA-0246(92), Apr. 1994).

Green Lights Program officials noted that they did not attempt to offset the reported reductions that may have been attributable to these other factors because they believe the program has offsetting impacts above and beyond the reductions reported by the participating organizations. For example, they noted several instances of nonparticipating companies that they believe undertook lighting actions as a result of information furnished by the Green Lights Program. However, they said they had not attempted to quantify the extent of the uncounted reductions by nonparticipants.

State and Local Outreach Program

According to EPA, 29 states and Puerto Rico have conducted inventories of their greenhouse gas emissions, 42 cities are developing action plans, and 7 demonstration projects have been selected for evaluation. Program officials said that although the program does not have a greenhouse gas reduction goal, it resulted in a reduction of 0.8 MMTCE in 1996.

Most of the reduction, about 0.7 MMTCE, was attributed to one demonstration project, called the Planet Protection Center. The main goal of this joint project between EPA and the approximately 46,000-member National Retail Hardware Association was to reduce residential energy use by promoting energy-efficient heating, lighting, and plumbing products. The participating retailers received materials to use in their stores to inform shoppers and salespeople, at the point of sale, about the benefits of buying energy-saving products. EPA officials said they initially estimated that 8 million households could reduce their energy consumption by an average of 10 percent because of the program. They said that to account for the possibility that market penetration might be less than 10 percent, as well as purchases that might have been made anyway, they halved the initial estimate.⁷ The result of these adjustments was an estimate that 8 million households did reduce their energy consumption by an average of 5 percent each.

Studies by an EPA contractor and the hardware association raised questions about the link between the program's activities and the reported reductions, as did our analysis of data in the hardware association's study. First, the EPA contractor that analyzed the data on the project's effects said that there was no concrete estimate of the project's impact because, among other reasons, of the difficulty of collecting sales data and a seeming lack of methods for reporting progress in greenhouse gas

⁷Although program officials said they adjusted the estimated reductions, in part, because some purchases might have been made without the program, we found no analytical basis for either the initial estimate or the adjustment to it.

emissions (which would result from reduced energy consumption).⁸ Second, the hardware association's 1995 study of the project's results found no overall difference in sales between the participating retailers and a control group of nonparticipants it surveyed, although it cautioned that the number of retailers responding was too small to be statistically significant.⁹ The study found that about one-third of the participating retailers who responded said they featured energy- and water-conserving products from time to time without the project. For this report, we analyzed certain data presented in the association's study, including sales data for 31 energy- and water-saving product lines. According to data from the responding retailers, sales at the nonparticipating retailers increased more than sales at the participating retailers for 17 of the product lines and less for the other 14 product lines.

Source Reduction and Recycling Program

Although the Source Reduction and Recycling Program has two elements—WasteWise and Unit-Based Pricing—EPA attributed virtually all of the program's results to WasteWise. According to EPA, 513 companies were participating in WasteWise as of March 1997. EPA reported reductions from WasteWise of 0.8 to 2.3 MMTCE in fiscal year 1995—the most recent year for which it calculated greenhouse gas reductions. As with energy efficiency measures, the trends over the past few years indicate a general movement toward increased recycling. Recognizing that recycling exists outside of the program, EPA asks the WasteWise participants to report separately on recycling associated with the program and general recycling efforts. EPA officials explained that they compile the participants' reports and check them for general reasonableness. However, they do not make any further adjustments.

When we spoke with seven WasteWise participants about their experience, six of them said they were pleased with the program, generally because they appreciated the free information provided on recycling and reducing wastes. While all six also said they were likely or somewhat likely to have made some of the improvements without the program, two said that they accelerated their actions because of the program. The seventh participant said his company was already taking all the steps recommended by the program.

⁸Planet Protection Center Program: Presentation and Discussion of Emissions Reductions Results," ICF, Inc. (1996).

⁹Environmental Merchandising and Advertising/Promotion in the Retail Hardware/Home Improvement Industry, National Retail Hardware Association (Indianapolis, IN: Aug. 1995).

The range in estimated reductions attributable to the WasteWise element is largely the result of incomplete reporting by the participants. For fiscal year 1995, less than half of the WasteWise participants reported their program accomplishments to EPA. The low-end estimate (0.8 MMTCE) was based on the amounts reduced and recycled by the reporting participants. The high-end estimate (2.3 MMTCE) was based on program officials' judgments that (1) some of the nonreporting participants also reduced their wastes and recycled and (2) the nonreporting participants who reduced and recycled did as much, on average, as did the reporting participants.

Coalbed Methane Outreach Program

According to EPA, as of February 1997, 13 projects had been started under the Coalbed Methane Outreach Program. On the basis of the data on methane reported by the coal companies, EPA reported gross reductions of 2.7 MMTCE in 1996.

EPA officials estimated that 60 percent of the gross reductions were the result of nonprogram factors and that the program achieved net reductions of 1.1 MMTCE in 1996. The primary nonprogram factor is the Energy Policy Act of 1992, which helped remove a barrier to the capture of coalbed methane. EPA officials said they calculated the 60-percent factor by estimating the increase in the amount of methane captured as a result of their program over the amount that would have been captured as a result of the 1992 act without their program.

Specifically, certain provisions of the 1992 act were intended to deal with the possibility that adjacent landowners could contest the ownership of coalbed methane, which could discourage coal companies from capturing that methane. To help overcome this barrier, the act provided that the Department of the Interior would implement a program, in certain states, relating to those entities claiming an ownership interest in a particular unit of coalbed methane. Under the program, these entities would be required to arrange for an escrow account to be established and the proceeds from the sales of such coalbed methane would be placed into that account. Ultimately, the proceeds would be distributed after a final legal determination of ownership interest.¹⁰

In addition, program officials said that they claimed credit for the reductions in coalbed methane only if the coalbeds were being mined.

¹⁰Such programs were to be established in states that, among other things, have disputes about the ownership of coalbed methane and that do not have programs promoting the permitting, drilling, and production of coalbed methane.

Thus, the methane captured from wells drilled into coalbeds was not counted if the coal was not yet being mined. That methane could be counted later, when the coalbed was being actively mined.

Projected Greenhouse Gas Reductions Exceed Historical Results for Three of the Four CCAP Programs We Examined

EPA's projections of future greenhouse gas reductions depend on a number of assumptions, such as the number of participants, the extent to which these participants will act to decrease emissions, and the extent to which the reductions are linked to the program's efforts. As discussed in detail below, for the Green Lights and Source Reduction and Recycling Programs, the reductions projected for 2000 are based on a level of performance by the participating organizations that exceeds the programs' results to date. EPA officials said they believe that the performance of many programs will improve over time, in part because of their experience and because of better targeting of the programs.

For the State and Local Outreach Program, about one-half of the projected reductions of 1.7 MMTCE for 2000 are attributed to the Planet Protection Center project. In the previous section, we noted that there are questions about whether some of the project's reported greenhouse gas reductions were the result of nonprogram factors; such questions would also apply to its projected reductions. For the Coalbed Methane Outreach Program, the projected reductions are consistent with experience to date, and EPA continues to attribute about 60 percent of the gross reductions to the 1992 Energy Policy Act. Thus, the estimated gross reductions of 6.1 MMTCE in 2000 are reduced to net reductions of 2.6 MMTCE as a result of the program.

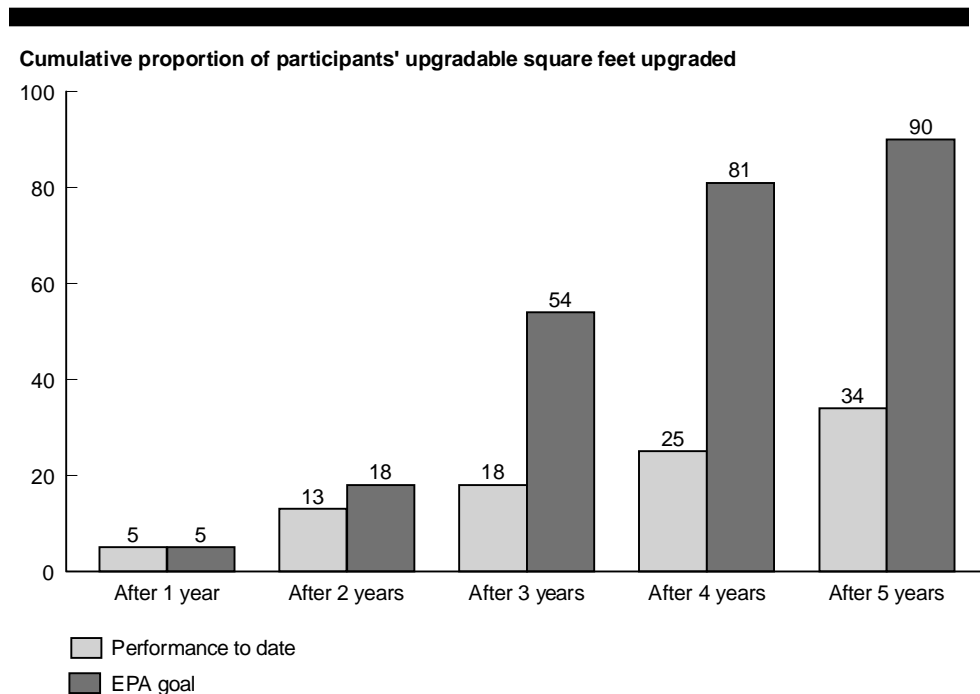
Green Lights Program

EPA estimates that the Green Lights Program will result in 3.9 MMTCE in annual greenhouse gas reductions in 2000; the estimate is based on several assumptions, including the amount of floorspace that will be upgraded with new lighting technology. When they join the Green Lights Program, the participants agree to survey the floorspace in all of their facilities and to upgrade 90 percent of the space which is considered upgradable and for which it is cost-effective to do so.

EPA established year-by-year goals, leading up to the 90-percent level after 5 years. For example, the goal is to upgrade 18 percent after 2 years and 54 percent after 3 years. In addition, EPA tracks the participants' accomplishments relative to these goals. According to EPA, the organizations that participated in the program for 5 years had upgraded

only 34 percent of their upgradable floor space within that time period. (See fig. 1.)

Figure 1: The Results of the Green Lights Program for the First 5 Years Were Below EPA's Goals



Source: EPA's data.

Program officials believe that in the future the participants will be able to achieve the 90-percent level because EPA has increased its level of support for the participants. For example, they are contacting participants more often to see if there is additional information that EPA can provide or if there are particular impediments that EPA can help them overcome. Program officials noted that the companies joining in 1995 exceeded the 18-percent goal established for upgrades through the second year of program participation. However, for participants joining in the 4 earlier years (1991-94), EPA's data show that the participants did not meet the 18-percent goal after participating for 2 years.

It may be difficult for EPA to achieve its Green Lights goals for two other reasons. The first reason relates to electricity prices. The Energy Information Administration projects that the average price of electricity will decline over the next 20 years by 0.6 percent per year after inflation, which would tend to make lighting investments less attractive. Moreover, the widespread discussion of deregulating electricity at the retail level, and the possible substantial cost decreases for larger users, create uncertainty about future electricity prices. An EPA program official noted that lighting investments are highly cost-effective and that any marginal decrease in electricity prices should make little difference to organizations that have joined the program. However, we note that decreasing or uncertain prices could make lighting investments appear less attractive to prospective Green Lights participants.

The second reason relates to possible “self-selection” bias among the initial Green Lights participants. In this context, self-selection is the likelihood that the organizations that voluntarily join a program may have been most likely to undertake those activities even if there were no program. Self-selection bias is a concern in evaluating the effectiveness of voluntary energy-efficiency programs, according to a paper on evaluating such programs.¹¹ To the extent that the organizations most likely to upgrade were the ones that joined the program initially, it may be difficult for EPA to continue to recruit large numbers of organizations into the program. However, EPA officials said they believe that a continued education campaign, coupled with successful upgrades by businesses, will make recruitment easier.

Source Reduction and Recycling Program

EPA estimated that the program’s WasteWise and Unit-Based Pricing elements would both achieve substantial reductions in 2000. For WasteWise, the reductions were estimated to range from 1.9 to 6.7 MMTCE. The lower estimate is based on the assumptions that a higher proportion of participants will reduce waste at the source and recycle in the future and that their average levels of source reduction will increase. Specifically, EPA assumes that the proportion of WasteWise participants that reduce waste will increase from 40 percent in 1995 to 90 percent in 2000 and that the proportion that recycle will increase from 75 percent in 1995 to 90 percent in 2000. Moreover, EPA assumes that the amount of waste reduced per participant will increase by 50 percent between 1995 and 2000. The higher level (6.7 MMTCE—more than three times the lower level)

¹¹Gretchen B. Jordan and Darrell A. Beschen, “Planning for Evaluation of the U.S. Department of Energy’s Energy Partnership/Climate Change Programs,” presented at the 1995 International Energy Program Evaluation Conference, Chicago, IL (Aug. 1995).

is based on additional assumptions designed to adjust for the reductions that EPA believes were underreported in 1995.

For Unit-Based Pricing, EPA estimated in 1995 that it would achieve reductions of 2.2 MMTCE in greenhouse gases in 2000. This projected level was based on an assumption that 575 communities would adopt a unit-based pricing approach to waste disposal each year. However, EPA program officials later found that only 72 communities adopted unit-based pricing in 1995. Program officials believe that the lower results for 1995 were the result of underestimating the time needed for the communities to implement unit-based pricing. The officials said that they now have the tools to promote a much greater adoption of unit-based pricing and that enrollments in 1996 and 1997 increased substantially.

Agency Comments

We provided copies of a draft of this report to EPA for review and comment. We received responses from three EPA offices. We received a letter from the Director, Office of Atmospheric Programs, Office of Air and Radiation, whose office manages the Green Lights and Coalbed Methane Outreach programs. (App. II contains the complete text of his letter, along with our detailed responses.) We also obtained comments from the Director, Climate Policy and Programs Division, Office of Policy and Program Evaluation; and the Director, Municipal and Industrial Solid Waste Division, Office of Solid Waste and Emergency Response. The former office manages the State and Local Outreach Program, and both offices are involved in the Source Reduction and Recycling Program.

The Director, Office of Atmospheric Programs, discussed the difficulties of evaluating the effects of voluntary programs. Also, he said that the draft report inaccurately used EIA's survey data to suggest that EPA overstated the reductions achieved by the Green Lights Program. We believe that we used these data fairly. We cited them to demonstrate that some companies with commercial office space had undertaken energy audits and installed energy-efficient lighting by 1992, when the Green Lights Program was just beginning. We believe that the factors that induced companies to take such actions before 1992 would likely have continued beyond 1992 and may, in part, account for some companies' decisions to join the Green Lights Program and to undertake upgrades. However, as noted in the report, EPA's reported reductions did not account for nonprogram factors that may have induced Green Lights participants to undertake upgrades.

The Director, Office of Atmospheric Programs, also stated that the climate-change programs are improving over time and that he does not believe that the projected reductions are optimistic. We noted that the projections are not consistent with experience to date. It is possible that, with the improvements he mentioned, the programs could meet their goals for 2000.

The Director, Climate Policy and Programs Division, objected to our including the State and Local Outreach Program in this review because it is considered a foundation program. That is, the program is not primarily intended to achieve reductions in greenhouse gas emissions. Rather, it is intended, among other things, to motivate state and local officials to understand the rationale behind taking actions to reduce emissions. As noted in the report, we included the program because, according to EPA's data, it was responsible for substantial reductions in greenhouse gas emissions in 1996 and is projected to achieve even more substantial reductions in 2000.

The Director, Municipal and Solid Waste Division, as well as the other two directors who commented on the report, provided updated data and technical corrections, which we incorporated in the report as appropriate.

We conducted our review from September 1996 through June 1997 in accordance with generally accepted government auditing standards. See appendix III for the details of our scope and methodology.

As arranged with your offices, we plan no further distribution of this report until 15 days after the date of this letter unless you publicly announce the report's contents earlier. At that time, we will send copies to the appropriate congressional committees and the Administrator of EPA. We will also make copies available to others upon request. If you have any questions or need additional information, please call me at (202) 512-6111. Major contributors to this report are listed in appendix IV.



Peter F. Guerrero
Director, Environmental Protection
Issues

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Abbreviations

CCAP	Climate Change Action Plan
EIA	Energy Information Administration
EPA	Environmental Protection Agency
GAO	General Accounting Office
MMTCE	million metric tons of carbon equivalent
OIG	Office of Inspector General

Participants, Funding, and Other Details About Four CCAP Programs

Dollars in millions

	Green Lights	Source Reduction and Recycling	Coalbed Methane Outreach	State and Local Outreach^a
Targeted gas(es)	Carbon dioxide	Carbon dioxide and methane	Methane	Various
Type of participants	Businesses and governments	Businesses and local governments	Coal companies	States, territories, and local governments
Number of participants	2,308	513	13 ^b	29 states, Puerto Rico, 42 cities
FY 1996 funding	\$20.1	\$2.9	\$1.7	\$5.3
Greenhouse gas reductions through FY 1996 (MMTCE)	0.6	0.9-2.4 ^c	2.7 ^d	0.8
Greenhouse gas reductions estimated in 2000 (MMTCE)	3.9	4.1-8.9	6.1 ^d	1.7

^aThe State and Local Outreach Program was primarily intended to help lay a foundation for greenhouse gas emission reductions beyond 2000, not to achieve greenhouse gas reductions by 2000. However, according to EPA, the program did achieve substantial reductions through 1996 and is expected to achieve even greater reductions in 2000.

^bRepresents number of projects.

^cData for the Source Reduction and Recycling Program are for fiscal year 1995.

^dRepresents "gross" reductions. "Net" reductions are estimated to be about 40 percent of the "gross" reductions—1.1 MMTCE in 1996 and 2.6 MMTCE in 2000.

Comments From the Environmental Protection Agency

Note: GAO comments supplementing those in the report text appear at the end of this appendix.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUN -9 1997

OFFICE OF
AIR AND RADIATION

Mr. Peter F. Guerrero
Director
Environmental Protection Issues
U.S. General Accounting Office
Washington, D.C. 20548

Dear Mr. Guerrero:

I appreciate the opportunity to review and comment upon the draft GAO Report, Information on Results of Four EPA Voluntary Climate Change Programs. My first comment is that the initial scope of your review, as presented in a Memorandum from GAO to EPA (August 27, 1996), was a much broader review of the Climate Change Action Plan (CCAP) programs than what you refer to in the Report. This original scope included first a determination of "the types of performance measures EPA has developed for CCAP programs." It is therefore disappointing that the draft Report fails to mention EPA's significant accomplishments in measuring, evaluating, and reporting on the progress of CCAP programs.

EPA has developed a successful and extensive system of performance measures and program evaluation. EPA devotes considerable effort to obtaining the best possible information upon which to evaluate the programs. For example, EPA reports the results of the Green Lights program based exclusively on detailed reports submitted by the program's partners on over 14,000 completed projects around the country. These efforts and the efforts of other programs have provided maximum accountability and valuable information for program development. EPA's performance measures have been reviewed in detail by your staff and are largely the basis for GAO's Report.

I would like to draw your attention to a recent report by the EPA Office of the Inspector General (OIG). The OIG recently completed a review of some of EPA's important CCAP programs (Risk Reduction Through Voluntary Programs, Audit Report No. E1KAF6-05-0080-7100130, 3/19/97). The OIG found that the programs "effectively estimated the impact their activities had on reducing risks to health and the environment," and that the programs "used good management practices," including good planning, progress evaluation, and program adjustment. The report concluded that "future voluntary programs could benefit from using similar measurement techniques." The revised, narrow focus presented in GAO's draft Report does not sufficiently recognize the high standard of accountability that EPA uses in evaluating and reporting on its CCAP programs.

See comment 1.

See comment 2.

**Appendix II
Comments From the Environmental
Protection Agency**

See comment 3.

While the GAO draft Report does include important issues regarding measuring program success, they are ones that are difficult for all market transformation efforts. EPA has always recognized that there are many difficult analytical issues in evaluating the success of voluntary, market-based programs, and has therefore conservatively estimated the impacts of the CCAP programs. EPA has openly discussed these issues with your staff. There is some uncertainty, for example, in isolating the effects of a program such as Green Lights from other factors within the market. This uncertainty can work in either direction -- leading programs to overestimate or underestimate results -- depending on the measurement techniques used. In order to address this uncertainty, EPA has either adjusted a program's numbers or chosen methodologies that would likely underestimate the net impact of a program. For two of the four programs examined, GAO points to the absence of specific "adjustments" as, in itself, a significant conclusion. For some programs, however, EPA has instead decided to use a generally conservative approach rather than make arbitrary "adjustments" where sufficient data is not available. GAO should recognize in the final Report that there are different means of handling uncertainty, that EPA has addressed these issues in a reasonable manner, and that EPA does not overstate its program accomplishments.

For example, the Green Lights program's reported accomplishments likely significantly underestimates the actual accomplishments for a number of reasons. The Green Lights program is an informational program that generates broad awareness and provides technical informational to everyone who is willing to use it, regardless of whether or not they join the program. EPA monitors the program's performance based exclusively on completed projects reported by those who join the program and fill out annual reports. EPA believes that this methodology is highly conservative. Although a majority of lighting technologies purchased today for buildings remain the least efficient technologies, there has nevertheless been substantial improvement in the market share of the more efficient technologies promoted by Green Lights since the program began in 1991 (based on U.S. Census manufacturing and sales data that we have shared with your staff). EPA is reporting only a fraction of this larger market improvement as being attributable to the accomplishments of the Green Lights program.

The true program impact of the Green Lights program is likely much larger than what EPA has been reporting to date, and EPA intends to study improved means of measuring this impact. We have provided your staff with evidence to support the many reasons that the Green Lights program estimates are conservative. The main reasons are summarized as follows:

- (1) The impacts of Green Lights' efforts to generate awareness of cost-effective investment opportunities for energy efficiency are widely dispersed, with only a portion of those who make such investments joining the program.
- (2) EPA widely distributes its important technical information on lighting. A large number of people who attend the Green Lights' lighting upgrade workshops, for example, do not belong to the program.

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- (3) Because partner reports are submitted once a year, there is up to a one-year time lag in measuring program performance. This is especially significant because the program's accomplishments are now rapidly accelerating; 40 percent of the program's current accomplishments have been generated by upgrades that were reported within the last year, despite the fact that the program is 6 years old. This alone suggests that true program impact is underestimated by 20% or more because of the reporting delay.
- (4) Not all partners complete and submit reports once they've completed lighting upgrades, resulting in under-reporting of partners' true accomplishments. EPA is studying alternative methods for information collection.

See comment 4.

The GAO Report raises some of the many important issues regarding measuring program results that EPA attempts to address in evaluating its CCAP programs. As the programs' market impact increases and better information becomes available, we intend to better isolate the broader market impact of the programs, rather than relying exclusively on techniques such as measuring direct program participation. EPA intends to study the issue further this coming year. EPA does not believe that asking a few partners retrospectively whether or not they would have completed the upgrade is an appropriate means of completing a study. The intent of the Green Lights and other CCAP programs is to generate awareness and provide the support and technical information needed to allow partners to invest in profitable energy efficiency. After realizing extremely high returns on their investments, while improving the quality of their lighting, it is not surprising that partners' hindsight includes "20/20" vision. We view this as a major accomplishment -- making energy efficiency investments part of the normal business practices is the ultimate measure of program success. However, we know from experience, and from the continued inefficient practices of a majority of businesses today, that getting partners to devote their capital to non-traditional investments, such as facility energy, is anything but normal business practice. This is also widely documented outside of our own program experience (including the Office of Technology Assessment study referenced in the GAO Report). Although GAO has not shared with us the names of the companies that it finally interviewed, I encourage you to discuss with my staff that supports these partners the considerable efforts it took to turn each of those partners into a success story.

See comment 5.

With regard to estimating the future impact of the programs, EPA does assume that, for some programs, current and future partners will do better than initial partners in the program. For example, the Green Lights program expects that partners who have recently joined the program will do better in meeting their full commitments than the partners that joined in the first year (i.e., the partners that have been in the program for the full five years of the commitment). As you acknowledge in the Report, EPA has demonstrated that this improvement is already occurring. After two years in the program, for example, partners that joined in 1995 have done considerably better than the first year's partners, achieving four times the energy and pollution reductions (despite smaller commitments). This success has improved steadily since the beginning of the program, and current partners are well ahead of the program's targets. This is in part due to changes made in the program to improve partner support. EPA is pleased that the

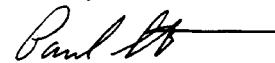
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programs are improving through time, and does not believe that the forecasted program impacts are optimistic. As mentioned previously, the program impact is increasing rapidly: 40 percent of the program's current accomplishments have been generated by upgrades that were reported within the last year, despite the fact that the program is 6 years old.

Finally, I would like to point out that the draft report inaccurately uses the Energy Information Administration's (EIA's) survey of commercial floorspace to suggest that EPA overstates the reductions achieved by the Green Lights program. The EIA survey is based on 1992 data. EPA only measures additional energy savings for the Green Lights program that would be above and beyond the pre-existing "conservation features" identified in EIA's survey. Also, as we have noted to you in the past, EIA has only asked respondents to indicate the presence of some energy conservation features in their buildings. They have not evaluated the effectiveness of these energy conservation features. In fact, EIA found that the energy intensities for buildings with conservation features, as defined by EIA, are "the same or even greater than the energy intensities of buildings without those features" (p. 11). In contrast, Green Lights program partners are, on average, reducing their lighting energy consumption by 48 percent through comprehensive lighting retrofits.

There are some additional numbers and references that appear somewhat inconsistent with information that we have provided to you. My staff is providing these clarifying comments separately.

Sincerely,



Paul M. Stolpman
Director
Office of Atmospheric Programs

See comment 6.

The following are GAO's comments on the Environmental Protection Agency's letter dated June 9, 1997.

GAO Comments

1. When we began our work on this assignment, one of our objectives related to the types of performance measures used for EPA's climate change programs. As agreed with the requesters' offices, we did not pursue this issue in detail. However, our report does provide information about EPA's performance targets, collection of data from participants, and related matters.

2. As part of our review, we considered the Office of the Inspector General's (OIG) report. The OIG's report differs somewhat from our report in terms of both scope and objectives. Whereas we reviewed only voluntary climate change programs, the OIG reviewed voluntary climate change programs, as well as the Radon Action Program, which is not related to climate change. In terms of objectives, we focused exclusively on the reported and projected reductions of greenhouse gas emissions for the four climate change programs. The OIG's objectives were to determine (1) the management practices that worked well and areas in which improvements are needed and (2) whether voluntary programs achieve environmental benefits. Although the second OIG objective sounds similar to our objectives, the OIG did not attempt to determine whether nonprogram factors may account for some of the reductions reported by EPA. The OIG's report states that "it is difficult to directly attribute changes in the environment to a particular statute, regulation, or program." For these reasons, we believe that the OIG's report is not directly comparable to ours, and we therefore did not change our report to address this comment.

3. EPA noted that measuring the success of programs to bring about change in specific markets is difficult. We agree. EPA characterized its approach in estimating the effects of its programs as "conservative" and stated that the "true program impact of the Green Lights program is likely much larger" than the reductions reported by EPA. While EPA states that the program's total impact is likely to be much larger than its reported impact, this can be true only if the unreported reductions that are due to the program are larger than the reported reductions that are due to nonprogram factors. However, EPA has not attempted to measure either of these indicators.

With respect to the issue of evaluating the net effect of the Green Lights Program, we are pleased to learn that EPA "intends to study improved

means of measuring” the program’s total impact. Successful completion of this study and implementation of its suggestions should help ensure that, in the future, there will be more reliable information on the program’s gross and net impacts.

4. EPA raises questions about both the purpose and the results of our discussions with the organizations that participated in the Green Lights Program. The purpose was to ask them about their experience with the program, including the extent to which the program contributed to their lighting upgrades. By contacting only those organizations that had participated successfully, we were dealing with a group that was likely to be relatively favorable toward the program. The result of the discussions was that, rather than exhibiting perfect hindsight, as EPA’s response suggests, all gave credit to EPA for providing valuable and reliable information and for being responsible for some or all of their upgrades. We believe this information, along with the other information presented, supports the point that only some, but not all, of these organizations’ upgrades were due to the program.

5. With respect to possible improvements in the program’s effectiveness, we presented data from EPA on results through 2 years for organizations that joined in 1995 (the class of 1995). The future implications of this reported improvement are unclear for two reasons. First, we also noted that, unlike the four previous classes, the class of 1995 was the only one to meet EPA’s goal of upgrading 18 percent of upgradable floorspace after 2 years. Second, the reason for the improvement is not clear. EPA claimed that its improved efforts accounted for the improvements. However, it is also possible that a change in reporting practices may have contributed to the reported improvement. Specifically, starting in 1993, organizations joining the program were permitted to claim credit for upgrades they had completed prior to joining the program. Initially, they were permitted to claim credit for upgrades made in the previous 12 months; later, they were permitted to claim credit for upgrades made in the previous 18 months. Thus, the larger reported results for the class of 1995 may, in part, reflect a change in reporting practices.

6. We cited the 1992 Energy Information Administration’s survey data for the same reason we interviewed former participants (see comment 4). We wanted to see whether there was evidence that companies with commercial office space were undertaking energy audits and installing energy-efficient lighting independent of the Green Lights Program. The survey data confirmed that there was substantial activity in the years

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before the program was established. If energy-efficient lighting was installed in some buildings before the program was established, we believe that energy-efficient lighting installed afterwards in other buildings may have been due, at least in part, to nonprogram factors.

Scope and Methodology

As agreed with your offices, of the Environmental Protection Agency's (EPA) 20 Climate Change Action Plan (CCAP) programs, we selected the following four for our review: Green Lights, Source Reduction and Recycling, Coalbed Methane Outreach, and State and Local Outreach. These four programs represent about one-third of EPA's CCAP funding and about one-third of the estimated greenhouse gas reductions planned by EPA for 2000—the year in which the action plan hoped to stabilize greenhouse gas emissions at about the 1990 level. Although the State and Local Outreach Program was not intended primarily to achieve reductions through 2000, we included it in our review because EPA reported that it did achieve substantial reductions through 1996 and was expected to achieve even greater reductions in 2000.

To address our objectives for all four programs, we met with EPA program officials for the four programs to discuss their reported program reductions and the steps they take to ensure that the reductions reflect the program's actions, rather than other factors. We also reviewed the reported results from the organizations that have joined the programs and the program offices' methods for calculating actual and planned greenhouse gas reductions. We also reviewed other available reports, from GAO and other organizations, on EPA's voluntary programs. In those cases where EPA adjusted reported or projected reductions (to remove the effects of nonprogram factors), we did not attempt to determine the reasonableness of those adjustments.

In addition, as noted below, we discussed the programs with selected current or former participants and nonparticipants. Although we tried to select a mix of organizations, in terms of size and geographic location, the organizations we contacted may not be representative of all such organizations. Finally, as noted below, we used other data sources.

For the Green Lights program, we interviewed officials at seven former participants, which had graduated from the program, about their motivations for joining the program and their experiences in the program. We picked these seven from a list of about 300 program graduates provided by EPA. The seven included small, medium, and large organizations, which are located in various regions of the country and are in different industries. Because program officials said they were concerned that our contacting current Green Lights participants might discourage participation, we did not contact any current participants. We also interviewed officials at two major corporations that were not participating in the program, to determine whether they had undertaken

lighting upgrades. To review the extent of the lighting upgrades already under way, we reviewed the results of a 1992 Energy Information Administration survey on commercial buildings and energy-saving features. We also reviewed data provided by the Edison Electric Institute on electric utilities that sponsored energy-efficient lighting rebate programs.

For the Source Reduction and Recycling Program, we interviewed officials at seven current program participants about their motivations for joining the WasteWise component. We also reviewed EPA's March 1996 report, Characterization of Municipal Solid Waste in the United States: 1995 Update, to determine the historical trends in the recycling of waste. For the Coalbed Methane Program, we interviewed representatives from two coal mining companies about their motivation for joining the program and their satisfaction with EPA's efforts.

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