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United States General Accounting Office

GAO

Report to Congressional Committees

June 1997

GLOBAL WARMING

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

Voluntary Programs

GAO/RCED-97-163

GAO

United States
General Accounting Office
Washington, D.C. 20548

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

[1]The 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.)

[2]Greenhouse 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.

[3]According 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.

[4]EPA refers to it as WasteWi$e.

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

[5]According 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.

[6]This 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

[7]Although 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.

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

[9]Environmental 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.

[10]Such 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.

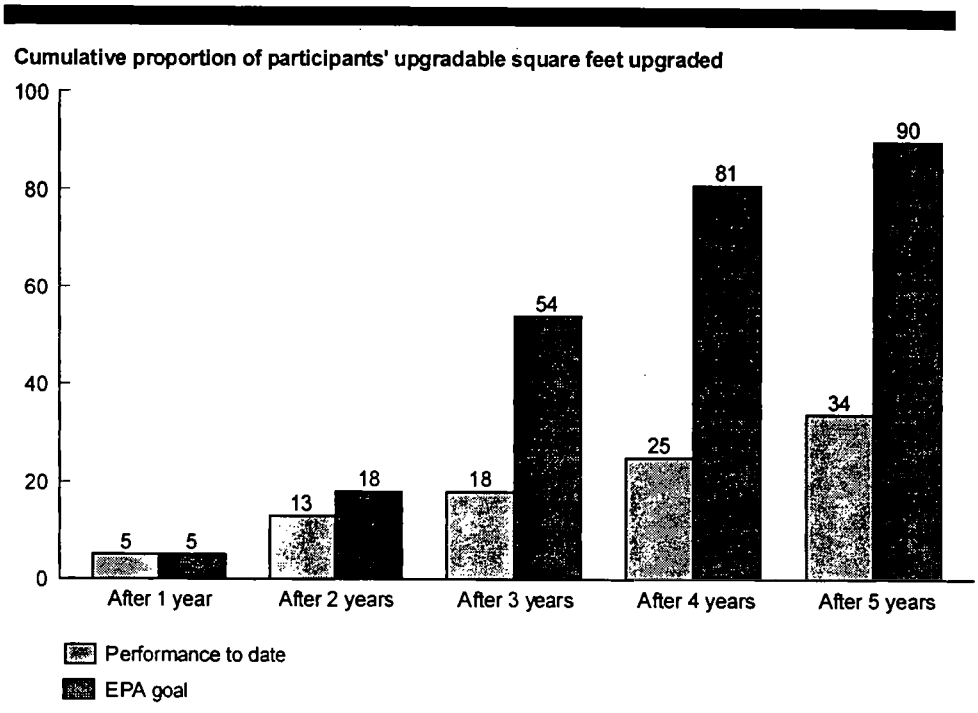
Green Lights Program

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)

[11]Gretchen 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

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

SENIOR ECONOMIST

7 August 97

MEMORANDUM FOR TODD STERN

From: Rosina Bierbaum RB
Jason Shogren JS

RE: Voluntary programs for climate change

Background.

You asked for information on the existing voluntary programs to reduce greenhouse gas emissions. Here is our initial response based on a quick review of the literature. If you wish, we can get more detailed information or arrange for briefings.

The Climate Action Plan (CCAP) put into place by the USG in 1993 consisted of over 40 voluntary actions across most sectors: residential and commercial buildings, industry, transportation (only a few), energy supply, forestry, and land-use changes. These CCAP actions were projected to reduce emissions by 108 million metric tons of carbon (MMTC) by 2000, enough to return US emissions to 1990 levels (if energy prices had remained high and the US economy had not grown so vigorously). In the US National Communication (required by the framework convention) released yesterday by the State Department, USG now estimates that CCAP will reduce emissions by 76 MMTC in 2000. To date, however, the best DOE and EPA guess is that today these programs have achieved over 15 percent (12-14 MMTC) of this revised goal.

Two factors that have limited the effectiveness of CCAP are: (1) funding levels have been at about 50 percent due to Congressional opposition; and (2) the energy prices have fallen more than expected. Also 11 of the 44 programs have been terminated.

How well have the voluntary programs worked thus far?

- **CCAP**. There has been little evaluation of the effectiveness of the CCAP program. In June, GAO released its review of four EPA's voluntary climate change programs. GAO concluded that "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 with the fourth program (the coalbed methane outreach program)." One page summaries of the four programs are attached. Participation rates have fallen behind expectations.

- **Other voluntary programs**. For other environmental issues, a recent review of several voluntary industrial programs concluded: "we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system." The programs that seem to have worked had relatively simple and clear objectives understood by both the government and business; enabled participants to have a major voice in the establishment of goals; and granted significant flexibility for implementing program objectives. In general, these programs mandate performance goals rather than technology. Not surprisingly, industry liked programs that increased economic benefits, competitive advantage, and flexibility. It might be worthwhile to examine in more depth the elements of some of the programs (33/50) that GEMI finds successful.

- **DOE's Industries of the Future program**. This program is a collaborative effort between industry and government to develop "technology roadmaps" to reach goals of energy-efficiency and "competitiveness" in seven industries. The industries are aluminum, chemicals, forest products, glass, metal casting, petroleum, and steel. Although the program is only a year old, DOE is now actively funding RFPs consistent with the roadmap. This new effort could serve as a basis to develop further voluntary actions with industry since it is already in place.

Attachments: Scorecard of CCAP emission reductions
One-page summary of 4 voluntary climate change programs
"Industrial Incentives for Environmental Improvement" GEMI report
Industries of the Future

Summary of Greenhouse Gas Emissions-Reduction Actions

Million Metric Tons of Carbon Equivalent

Source: U.S. Climate Action Report—1997

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
Residential & Commercial Sector Actions		**26.9**	**10.3**	--
New	Rebuild America	2.0	1.6	--
1 and 2	Expanded Green Lights and Energy Star Buildings	3.6	3.3	--
3	State Revolving Fund for Public Buildings	1.1	Terminated	
4 5	Cost-Shared Demonstrations of Emerging Technologies Operation and Maintenance Training for Commercial Building Facility Managers and Operators	3.8	0.0	--
6	Energy Star Products	5.0	4.3	--
7	Residential Appliance Standards	6.8	0.2	--
8 and 11 9 10	Energy Partnerships for Affordable Housing Cool Communities Update State Building Codes	4.4	0.4	--
New	Construction of Energy-Efficient Commercial and Industrial Buildings		0.1	--
New	Superwindow Collaborative		0.0	--
New	Expand Markets for Next-Generation Lighting Products		0.2	--
New	Fuel Cells Initiative		0.0	--
Industrial Sector Actions		**19.0**	**4.8**	--
12	Motor Challenge	8.8	1.8	--
13 14	Industrial Golden Carrot Programs Accelerate the Adoption of Energy-Efficient Process Technologies	2.9	Merged into Action 12 Terminated	
15	Industrial Assessment Centers	0.5	CCAP Component Terminated	
16	Waste Minimization	4.2	2.1	--
17 18	Improve Efficiency of Fertilizer Nitrogen Use Reduce the Use of Pesticides	2.7	0.8 Terminated	--
Transportation Sector Actions		**8.1**	**5.3**	--
19 20 21	Cash Value of Parking Innovative Transportation Strategies Telecommuting Program	6.6	4.6	--
22	Fuel Economy Labels for Tires	1.5	0.7	--
Energy Supply Actions		**10.8**	**1.3**	--
23	Increase Natural Gas Share of Energy Use Though Federal Regulatory Reform	2.2	Terminated	

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
24	Promote Seasonal Gas Use for Control of Nitrogen Oxides	2.8	0.5	--
25	High-Efficiency Gas Technologies	0.6	Terminated	
26	Renewable-Energy Commercialization	0.8	0.3	--
27	Expand Utility Integrated Resource Planning	1.4	Terminated	
28	Profitable Hydroelectric Efficiency Upgrades	2.0	0.0	--
29 30	Energy-Efficient Distribution Transformer Standards Energy Star Distribution Transformers	0.8	0.5	--
31	Transmission Pricing Reform	0.8	Terminated	
New	Green Power Network	Not included	0.0	--
Land-Use Change & Forestry Actions		**10.0**	**2.4**	--
43	Private Depletion of Nonindustrial Private Forests	4.0	Terminated	
44	Accelerate Tree Planting in Nonindustrial Private Forests	0.5	0.4	--
16	Waste Minimization	4.2	2.0	--
9	Expand Cool Communities	0.5	To be determined	
Methane Actions		**16.3**	**15.5**	--
32	Expand Natural Gas STAR	3.0	3.4	--
33	Increase Stringency of Landfill Rule	4.2	6.3	--
34	Landfill Methane Outreach Program	1.1	1.9	--
35	Coalbed Methane Outreach Program	2.2	2.6	--
36	RD&D for Coal Mine Methane	1.5	Terminated	
37	RD&D for Landfill Methane	1.0	Terminated	
38	AgSTAR Program	1.5	0.3	--
39	Ruminant Livestock Efficiency Program	1.8	1.0	--
Actions to Address Other Greenhouse Gases		**16.3**	**25.4**	--
17	Improved Fertilizer Management	4.5	5.3	--
40	Significant New Alternatives Program	5.0	6.4	--
41	HFC-23 Partnerships	5.0	5.0	--
42	Voluntary Aluminum Partnership	1.8	2.2	--
New	Environmental Stewardship Initiative	Not included	6.5	--
Foundation Actions			**11.3**	--
	Climate Wise	Not estimated	1.8	--
	Climate Challenge	Not estimated	7.6	--
	State and Local Outreach Programs	Not estimated	1.9	--
Total GHG Emission Reductions From CCAP		**108.6**	**76.0**	**14.0**

Data is not readily available for cumulative emissions reductions for many CCAP programs. Cumulative emissions reductions of about 5 MMTCE can be attributed to DOE's CCAP programs. EPA's Office of Air and Radiation is responsible for cumulative emissions reductions of about 9 MMTCE through their CCAP programs.

United States General Accounting Office

GAO

Report to Congressional Committees

June 1997

GLOBAL WARMING

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

GAO/RCED-97-163

GAO

United States
General Accounting Office
Washington, D.C. 20548

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

[1]The 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.)

[2]Greenhouse 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.

[3]According 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.

[4]EPA refers to it as WasteWi$e.

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

[5]According 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.

[6]This 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

[7]Although 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.

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

[9]Environmental 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.

[10]Such 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.

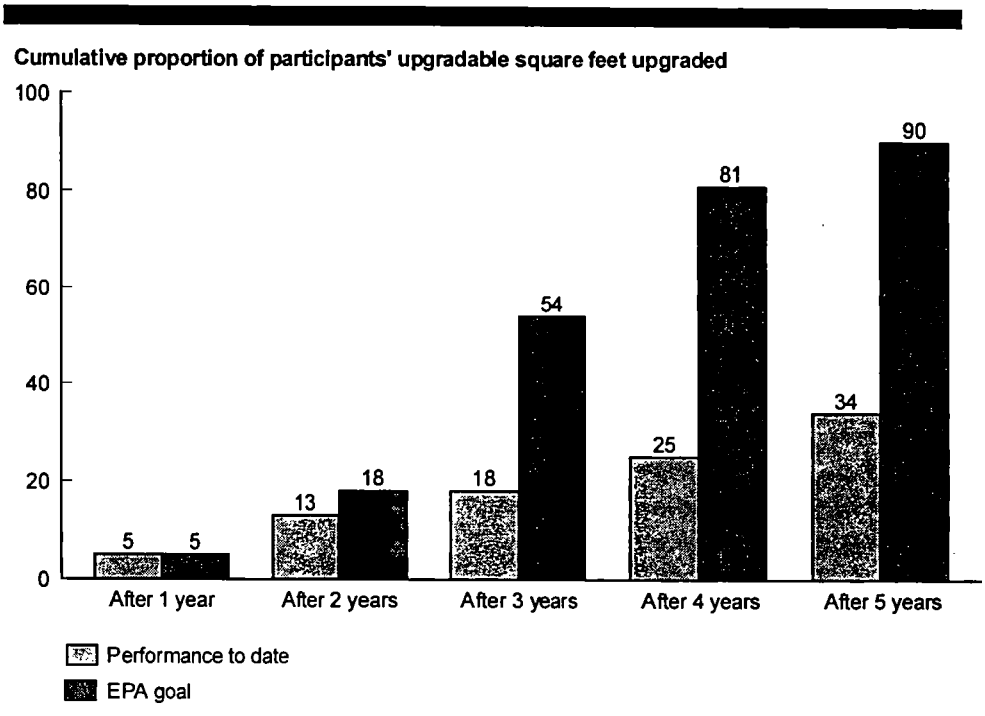
Green Lights Program

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)

[11]Gretchen 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

INDUSTRY INCENTIVES FOR

ENVIRONMENTAL IMPROVEMENT

Combined Executive Summary

for

Three Reports

Submitted to the

IDEA 21 Work Group of the

Global Environmental Management Initiative

(GEMI)

- *Industry Incentives for Environmental Improvement: Evaluation of U.S. Federal Initiatives*
  by Terry Davies and Jan Mazurek

- *Corporate Environmental, Health and Safety Practices in Transition: Management System Responses to Changing Public Expectations, Regulatory Requirements and Incentives*
  by Terry F. Yosie and Timothy D. Herbst

- *Incentives for Environmental Improvement: An Assessment of Selected Innovative Programs in the States and Europe*
  by Daniel P. Beardsley

The GEMI organization manages critical thinking about key environmental, health and safety issues. GEMI's Work Group, ***Incentives, Disincentives, Environmental Performance and Accountability for the 21st Century***, (***IDEA 21***), recently sponsored three independent research projects to better define and characterize incentives leading to improved environmental performance by business. GEMI supports and encourages full stakeholder review and consideration of these analyses. Without endorsing the analyses or advocating any particular set of actions, GEMI wants to provide the "spark" and energy that leads to discussions of environmental, health and safety issues.

GEMI commissioned these studies to provide the basis for further discussions with EH&S thought leaders. GEMI will make these studies available to other groups to use in developing models for the future. To this end, the *IDEA 21* Work Group has invited 20 or so top EH&S professionals to a two-day workshop later in October to discuss the results of the studies. In keeping with its non-profit status, GEMI will not engage in advocacy. However, the environmental community and other multi-stakeholder groups have asked for information and ideas from the business community about incentive-based programs. The studies and the workshop are designed to provide this information.

The three reports provide the following conclusions about future use of incentives:

- Key stakeholders need to agree on clear, specific, measurable environmental objectives.

- Given agreement on performance objectives, entities responsible for implementation should have the freedom to design plans that take advantage of pollution prevention, process modification, and other innovative alternatives to mandated end-of-pipe controls.

- Clear procedures should be established for open stakeholder participation in the design and implementation of programs. At the same time, these processes need to be linked to the achievement of program objectives.

- Incentives for participation in programs of this kind need to be *tangible and significant*. At a minimum, they should offer reduced transaction costs, such as less duplicative reporting requirements and quicker permitting. To be more attractive, programs should provide direct economic incentives to mitigate the future costs of pollution control.

GEMI's premise is that well-structured incentive programs can be very effective in advancing environmental objectives while improving pollution control efficiency for the private sector. GEMI also believes that incentive-based programs show tremendous promise for further advances in environmental performance and total quality environmental management in corporate programs. Results from the studies (which reached remarkably similar conclusions) do not prove that the current array of federal incentive programs support the GEMI premise. However, the studies do not dispute the GEMI *concept* that incentive approaches offer tremendous future promise. Most federal programs are relatively new, are still being refined; and need more systematic evaluation. The experience of state and European efforts to date is more positive. This information about cooperative and flexible incentive-based programs will provide important ideas and information to the many discussions about environmental regulation taking place outside of GEMI.

Combined Executive Summary

A. Introduction

In April, 1996, the Global Environmental Management Initiative (GEMI)* sponsored three independent, related studies. This document is a combined executive summary for all three, although this booklet contains only one of the three reports. The combined summary was produced because the three researchers found many common conclusions in their reports. It also alerts the reader to the other reports in the series. The three reports are:

- *Industry Incentives for Environmental Improvement: Evaluation of U.S. Federal Initiatives* by Terry Davies and Jan Mazurek
- *Corporate Environmental, Health and Safety Practices in Transition: Management System Responses to Changing Public Expectations, Regulatory Requirements and Incentives* by Terry F. Yosie and Timothy D. Herbst
- *Incentives for Environmental Improvement: An Assessment of Selected Innovative Programs in the States and Europe* by Daniel P. Beardsley

One report examined corporate attitudes about the environment, changes in environmental behavior, and corporate responses to incentive-based health and safety programs. Another report reviewed five major environmental and safety programs managed at the federal level of the United States (Project XL, the Common Sense Initiative, the sulphur dioxide emissions trading program, the OSHA STAR program, and the 33/50 Program). The final report assessed selected new environmental programs in Western Europe (the Netherlands, Sweden, and the United Kingdom) and programs managed by American states (Minnesota, New Jersey, Massachusetts, and Colorado).

GEMI had several purposes in funding this research:

- to identify incentives which seem most promising in terms of encouraging the private sector to get to the "next level" of environmental protection. To achieve this aim, incentives would have to be strong enough to influence corporate behavior and would have to lead to measurable environmental benefits.
- to determine the extent to which recent innovative programs launched by the federal government, the states, and European countries have demonstrated the utility of incentive-based programs; and
- to make available findings of this research to appropriate decision makers.

* GEMI is a not for profit organization of 21 leading corporations dedicated to helping business achieve environmental, health and safety excellence.

GEMI's premise is that well-structured incentive programs can be very effective in advancing environmental objectives and making pollution control more efficient for the private sector. GEMI also believes that incentive-based programs have tremendous promise for advancing continuous improvement and total quality environmental management in corporate programs. Results from the studies (which came to remarkably similar conclusions) do not prove that the current array of Federal incentive programs support the GEMI premise. Neither do the studies dispute the GEMI *concept* that incentive approaches offer tremendous future promise. Most Federal programs are relatively new, still being refined, and in need of more systematic evaluation. The experience of state and European efforts to date is more positive. This up to date information about cooperative and flexible incentive-based programs will inform the many discussions about environmental regulation taking place outside of GEMI.

The three studies were undertaken during a five-month period. This document summarizes the findings of those three studies. Relatively little quantitative data exists which documents either explicit economic or other benefits of voluntary programs to the private sector or environmental accomplishments--due in large part to the recent initiation of the environmental programs reviewed, though also to the limited public and private commitment to program evaluation. Researchers relied on data that was available as well as extensive literature reviews and interviews with program designers and participants.

B. Findings

This paper summarizes the findings of all three reports using the following format: 1) factors which appear crucial to voluntary program success or failure; 2) conclusions about the future use of incentives; and 3) other conclusions.

1. Factors in Program Success or Failure

Programs that either *are* working well (such as the Dutch covenants, Sweden's permitting program, and the New Jersey pollution prevention/facility-wide permit project) or *appear* to be successful thus far (Minnesota's programs, the Integrated Inspection Program and Printers' Project in Massachusetts, the Integrated Pollution Control program in the United Kingdom; at the federal level, at least to some extent: OSHA's Star Program and EPA's 33/50 and SO2 trading programs) share some common features. Successful programs have objectives that are relatively simple and clear both to government and business and enable participants to have a major voice in the establishment of goals. All these programs grant significant flexibility to business to engineer the means for implementing program objectives. In apparent recognition of the environmental sophistication of industry now, compared to 25 years ago, these programs mandate performance goals rather than technology. A third common element in successful programs is trust among the participants and stakeholders. Literally every interviewee in the European programs, the New Jersey program, and designers of the Minnesota programs noted the importance of the mutual respect and cooperative spirit shared by participants in program development; interviewees from these and other programs also saw important benefits in improved relationships with

regulatory agencies. The evidence is mixed as to whether these innovative programs are sacrificing strong enforcement, particularly in the case of federal initiatives.

Several other, more specific considerations should be noted about successful programs. To the extent "success" is defined in environmental terms, it should be measured. Evidence exists from both third-party evaluators and interviewees that New Jersey's program contains environmental benefits; indicative data is also noted to support the benefits of the United Kingdom and Dutch programs. From the industry perspective, these and related programs work because the incentives for industry to participate were clear and substantive: participants see economic benefits (reduced transaction costs), competitiveness advantages (faster time-to-market), and, in the case of 33/50, the flexibility to choose the means to achieve reductions. Finally, it is perhaps important that almost every successful state program was supported by state legislation.

Less successful programs also share common features. Some are the reverse of positive factors noted above: lack of clear, shared program objectives between government and business (and even between levels of government-- many states seem to believe that XL is about *alternative compliance* while EPA insists facilities must go *beyond compliance*); over-control by government in establishing program objectives, combined with pervasive mistrust among the participants; uncertainty about either business or environmental benefits of the program; and absence of a statutory base. This latter feature deserves particular attention.

The lack of a statutory basis for environmental initiatives or programs always foreshadows difficulty. Because of congressional, court, public interest, and other pressures, civil servants tend to spend their time--rightly--on programs grounded in law; other initiatives have lower priority. Also, without a legal mandate, decisions must be made by some sort of consensus, which is rarely efficient or effective in an atmosphere as contentious as environmental management. The lack of a statutory base can be ameliorated by clear objectives, maximum participation in developing those objectives to ensure buy-in and flexible implementation tailored to the self-interest of the participants. Absent these process commitments, non-statutory programs almost always fail.

Business participants note another major problem with the CSI and XL programs. The incentives for program involvement are weak to begin with, and risks of litigation and other failures are high. Against this backdrop, companies are increasingly discouraged by the unexpectedly high transaction costs of participation. Investment of staff time can be enormous. There is frustration over the length of the project review process and confusion over the role of stakeholders; facilities receive conflicting signals from different levels of EPA staff; and EHS staff are having difficulty convincing other corporate executives of the tangible benefits of the programs. Costs of participation, in other words, are beginning to outweigh incentives.

2. Conclusions About Future Use of Incentives

The following principles should guide the use of incentives in future voluntary programs:

- Key stakeholders need to agree on clear, specific, measurable environmental objectives.

- Given agreement on performance objectives, entities responsible for implementation should have the freedom to design plans that take advantage of pollution prevention, process modification, and other innovative alternatives to mandated end-of-pipe controls.

- Clear procedures should be established for open stakeholder participation in the design and implementation of programs. At the same time, these processes need to be linked to the achievement of program objectives.

- Incentives for participation in programs of this kind need to be *tangible and significant*. At a minimum, they should offer reduced transaction costs, such as less duplicative reporting requirements or quicker permitting. To be more attractive, programs will provide direct economic incentives which mitigate the future costs of pollution control.

For business, however, incentive-based programs must also be leveraged with other major drivers of corporate environmental performance. These include: performance-based management goals; cost-reduction objectives; industry sector characteristics; and reputation value.

3. Other Conclusions

Regarding the federal voluntary or incentive-based programs studied in this report, we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system. The sulphur dioxide emissions trading program--different in kind from the other four analyzed--may be an exception to this in mitigating costs for participating companies.

This is not to say that the *concepts* undergirding these programs are flawed. Companies welcome economic incentives and they are willing to exchange these benefits for greater commitments to environmental protection. Despite the cynical expectation, private sector support for incentive programs is not only economic: many of those interviewed believe that well-designed incentive programs are more beneficial for the environment. The problem for current federal programs seems to be in the need for better implementation: broader stakeholder participation in program design; clearer incentives and environmental protection objectives; a shared sense of purpose among federal, regional, and state government officials; and, probably, in the need for a statutory base.

The record of new state (and European) programs, though still uncertain given how recently these initiatives have been started, is more positive. States have been more effective in making facility managers feel involved in design and implementation. Trust and cooperation between government and the private sector is much higher in the state programs. Companies identify clear existing or potential benefits, mostly economic, but others as well. Where data exists, as in New Jersey and the United Kingdom, it suggests that measurable environmental benefits can be gained from properly structured incentive programs. The more successful programs are supported by legislation.

A likely shortcoming of the state programs, and the federal initiatives as well, is that both environmental and economic achievements will turn out to be marginal. As these experimental programs continue and are improved, consideration should be given to simply making them bolder--environmental objectives need to be made clearer and more measurable, and existing incentives for participation should be made more significant.

EXECUTIVE SUMMARY

This report evaluates new or existing business/government initiatives in the United States at the federal level. Primarily, we attempt to identify the elements of the program which would cause business to behave in a manner different from that required under a traditional command and control approach.

Five federal programs were selected for evaluation: the OSHA Star program and four EPA initiatives: the 33-50 program, Common Sense Initiative (CSI), Project XL, and SO_2 emissions trading. These programs represent the most prominent current efforts to motivate environmental improvement by business firms outside of the command-and-control framework.

The most important conclusion about the federal programs examined is that four of the five programs (SO_2 emissions trading is different in almost every way from the other four programs) are peripheral, both to business and society. They do not address most of the important problems with the pollution control system nor do they appear to contribute significantly to improving environmental quality or safety.

OSHA Star and the programs related to it have succeeded in establishing a positive image, but it is very debatable whether the programs have made any major contribution to occupational safety and health. XL and CSI may be too new to evaluate with any certainty, but there is no indication that either program will make a major contribution to environmental improvement or to lowering the cost of the pollution control system. 33/50 is quite different from XL and CSI in that the transactions costs of participating were close to zero. The minimal threshold for participation and the looseness of the criteria for success make it difficult to know how much impact 33/50 had.

In terms of their attractiveness to business, our review of the initiatives shows that there is no single incentive that appeals to all businesses. In fact, it is difficult to find a voluntary federal initiative that appeals to business at all. The emissions trading program is an exception, since it is required by law and participation clearly saves firms a significant amount of money. Our analysis of participation rates under the four voluntary federal programs studied show that the initiatives tend to attract very few businesses.

Of the four initiatives, 33/50 has attracted the most participants, followed by OSHA Star. Of the 8,000 manufacturers invited by EPA to join 33/50, about 14 percent signed on. There are about 98 companies with 231 work sites enrolled in OSHA's VPP program. Only ten facilities of extremely large U.S. market-leaders are implementing XL project plans. About 20 companies participate in CSI.

Table ES-1 shows that the different federal initiatives tend to feature different types of business incentives. Incentives depend in part on the goals of the program and types of firms that are targeted.

enviros, EPA, the states, Congress—often question the motives of the other elements and think that these other elements have a major advantage in whatever battles take place.

Environmental groups had misgivings about 33/50 because of the lack of any controls, and some groups argued for third-party audits to check on the results achieved by facilities. The program illustrates a fundamental conflict between the business community's desire for flexibility and simplicity and the environmental community's desire for certainty and enforceability.

Given the lack of consensus, if the badly broken pollution control system is to be mended it will have to be done through some problem-solving negotiating mechanism. It so happens that the Founding Fathers in their great wisdom provided just such a mechanism in the form of the U.S. legislative system. A basic conclusion to be drawn from our look at the administrative attempts at reform is that there is no short-cut, no way around the difficult task of trying to legislate a better system.

CHAPTER 1. OVERVIEW OF BUSINESS INCENTIVES

Theories of Incentives

Federal policy makers have several types of potential instruments at their disposal to promote corporate environmental excellence. Potential incentives include market-based strategies, such as emissions trading schemes, as well as voluntary programs that recognize and reward superior environmental performance.

While there is a rich literature that examines the relationship between business and laws designed to improve environmental health and safety, there are few theories and fewer quantitative studies which illustrate what incentives work best. Our literature search shows that most research on business incentives focuses not on the relationship between firms and federal regulators, but on how firms respond to other factors such as consumer demand, interest group pressure, and media attention.

In general, there exist three, distinct theoretical traditions on the role between business and federal health and environmental laws. These include what observers refer to as the "traditional" economic approach, the "revisionist" approach, and a more recent school of thought developed primarily by business, for business. The five initiatives examined below variously draw from these different groups of thought and research. Before discussing the performance of the five initiatives covered in this study, we will briefly review the three distinct sets of reports and findings that deal with incentives to industry.

The oldest and most data-rich of the three schools of thought on incentives comes from what is known as the "traditional approach."[1] Developed around 1960 -- roughly the same time as federal environmental laws and regulations were expanding -- the traditional environmental economic approach is premised on the idea that firms release pollution into the environment when pollution sources lack proper market signals. As the theory goes, laws that tell polluters how to reduce pollution tend to raise costs and lower productivity because firms, not government, know best how to control processes inside a plant.[2]

Environmental economists have conducted a number of studies on different industries which tend to reinforce the idea that command and control laws tend to raise manufacturing costs and lower productivity.[3] Based on theory and extensive research, traditionalists conclude that the

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[1] For a comprehensive review of this literature, see Jaffe, Adam B., Steven R. Peterson, Paul R. Portney and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 30. pp. 132-163.

[2] Cropper, Maureen L. and Wallace E. Oates. 1992. "Environmental Economics: A Survey," *Journal of Economic Literature*. Vol. 30. pp. 675-740.

[3] See, for example Barbera, Anthony J. and Virginia McConnell. 1990. "The Impact of Environmental Regulations on Industry Productivity: Direct and Indirect Effects." *Journal of Environ. Econ. Manage.*, Jan. 1990, 18(1), pp. 50-65. Gray, Wayne B. and Ronald J. Shadbegian, 1994. "Pollution Abatement Costs, Regulation, and Plant-Level Productivity." National Bureau of Economic Research, Cambridge, MA.

most effective and efficient way to improve environmental performance is to develop policies that harness market forces and let polluting firms decide how best to curb pollution.[4]

While the traditionalist school has endorsed the development of market-based incentives for several decades, most market-based initiatives are quite recent in origin. While they vary in scope and design, most market-based efforts encourage industries to trade emissions credits. Firms that are able to control pollution cost effectively sell credits to other companies that find control less cost effective. The sulfur dioxide allowance trading program, which targets utilities regulated under the Clean Air Act, is perhaps the most prominent of such initiatives and is examined in greater detail later in this report.

Recently, a small group of scholars has begun to revise the traditional economic approach in order to examine what effects environmental regulations have on the competitiveness of U.S. firms.[5] This "revisionist" group, associated with Harvard professor, Michael Porter, conclude that companies can use environmental requirements to gain market advantage over competitors. While intuitively appealing, the Porter hypothesis, for the most part, is yet to be supported with much empirical evidence. One recent review of the literature in this area concludes that both the purported positive and negative effects of environmental regulation on competitiveness were difficult to detect.[6] Despite the dearth of evidence to either support or refute Porter's hypothesis, some have nonetheless embraced his assertion that regulations can promote both economic growth and cleaner production.[7] The Common Sense Initiative (CSI), a recent EPA effort to promote "cleaner, cheaper" production through regulatory reform, is motivated, in part by revisionist assumptions. We examine CSI in greater detail below.

The third major strand of literature, perhaps most relevant to this study, is rooted more squarely in business traditions. Comprised of articles penned either by business leaders or industry consultants, the central premise of the business literature is that industry best understands what drivers are most appropriate.[8] In this regard, it is not inconsistent with traditionalist tenets. However, few business experts believe that firms operate according to the elegant theories advanced in college economics classes. There also are often strains of Porter's ideas in the

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[4] See, for example Barbera, Anthony J. and Virginia McConnell. 1990. "The Impact of Environmental Regulations on Industry Productivity: Direct and Indirect Effects." *Journal of Environ. Econ. Manage.*, Jan. 1990, 18(1), pp. 50-65. Gray, Wayne B. and Ronald J. Shadbegian, 1994. "Pollution Abatement Costs, Regulation, and Plant-Level Productivity." National Bureau of Economic Research, Cambridge, MA.

[5] Porter, Michael E. 1990. *The Competitive Advantage of Nations*. New York: Free Press. See also, "America's Green Strategy," 1991. *Scientific American*. Apr. p. 168.

[6] For a comprehensive review of this literature, see Jaffe, Adam B., Steven R. Peterson, Paul R. Portney and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 30. pp. 132-163.

[7] Jaffe, et. al. op. cit. p. 157.

[8] See, for example, "Corporate Environmentalism" 1992. *Columbia Journal of World Business*. Vol. 27. Nos. 3 and 4; Smart, Bruce. 1992. *Beyond Compliance: A New Industry View of the Environment*. Washington, D.C.: World Resources Institute; *The Greening of Environmental Business: Making Bottom-Line Sense of Environmental Responsibility*. Thomas F. P. Sullivan, ed. Rockville, MD: Government Institutes; *Changing Course: A Global Business Perspective on Development and the Environment*. 1992. Stephan Schmidheiny with the Business Council for Sustainable Development. Cambridge, MA: The MIT Press; Elkington, John and Tom Burke. 1987. *The Green Capitalists: Industry's Search for Environmental Excellence*. London: Victor Gollancz Ltd.

business literature as well: some environmental leaders say that good environmental practice is good for business.

According to the business literature, incentives to business should recognize and reward voluntary business efforts to deliver environmental performance superior to requirements set out under existing laws and regulations. The U.S. Environmental Protection Agency's 33/50 program and the Star program advanced by the Occupational Safety and Health Administration (OSHA), follow these tenets and are examined in greater detail below.

While it most closely reflects real-world business practices, the business literature is the least theoretical of the three. The business findings also are supported by the least quantitative data. Most accounts of what drive industry to deliver superior results are anecdotal and derived either from roundtable discussions, expert panels, or non-scientific surveys. One reason so little quantitative data exists to support these assertions may stem from the fact that it is not in a firm's interest to release data that potentially may fall into the hands of competitors or generate adverse publicity. Often firms do not collect data that would be relevant to assessing incentives or collect it in a way that makes comparisons impossible.

There is evidence that some scholars are starting to fill the business data void. One example is a recent study in the business literature that attempts to identify what determines how companies respond to public expectations on natural environmental issues.[9] While the focus of the research differs slightly from the question of what incentives the federal government can use to better target business, the results nonetheless appear to support influential, qualitative studies in the business literature.

Researchers surveyed medium-sized U.S. steel and semiconductor manufacturing facilities and then subjected the results to expert review. To secure the data, participating firms were promised anonymity. Overall, the researchers found that the "legitimacy" of environmental concerns is the most important incentive for firms that have proactive environmental strategies. In other words, managers must perceive societal expectations concerning the environment as justifiable. Cooperation and trust with regulatory agencies were other factors that distinguished proactive firms. The study also found that, in almost all cases, corporate environmental leaders are led by a top executive who is clearly committed to environmental issues. While the study does not make policy recommendations, the findings suggest that initiatives which build trust between companies and federal regulators may appeal to some businesses.

The recent business findings are consistent with other research that contrasts the U.S. environmental system with that of other industrialized countries.[10] The research based on international comparisons suggests that the U.S. system of laws and administrative procedure tends to place industry and regulators at odds.

Due in part to the inherently litigious and time-consuming nature of the present system reflected in the writings on business, some conclude that reform is simply not possible under the

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[9] Judge, William Q. Alex Miller and Dorn Fowler. 1996. "What Causes Corporate Environmental Responsiveness." *Corporate Environmental Strategy*. Vol. 3. No. 3. pp. 42-48.

[10] Wallace, David. 1996. *Environmental Policy and Industrial Innovation: Strategies in Europe, the U.S. and Japan*. The Royal Institute of International Affairs. London: Earthscan Publications Ltd.

2. 33/50 PROGRAM

Program Description

EPA's 33/50 Program is a voluntary pollution prevention initiative that began in the late 1980s. The Program was an outgrowth of several events. In 1989, EPA formed its first voluntary pollution reduction agreement with nine "ATERIS" (Air Toxics Emissions Reductions Inventory System) companies to reduce 83 percent of their toxic air emissions by 1993.[1] This agreement was made between then-Administrator William K. Reilly and the ATERIS chief executive officers in an experiment to test the potential for using voluntary agreements to pollution control.

The following year, the Science Advisory Board's report, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* emphasized the threat of toxic chemicals and stressed the need for source reduction as the preferred method to reduce public risk, directing EPA's attention towards reducing toxics.[2] During the same month, the Pollution Prevention Act of 1990 was passed. It emphasized reducing the quantity of hazardous substances, pollutants, or contaminants from entering a waste stream or being released into the environment prior to recycling, treatment, or disposal. The legislation focused on methods for reducing waste at its source and otherwise preventing the creation of pollution, rather than on controlling or treating emissions.

In response to the increased focus on pollution reduction, EPA launched the 33/50 Program which sought voluntary cooperation from industrial firms to significantly cut toxic chemicals in releases and transfers primarily through source reduction. The Program used EPA's Toxic Release Inventory (TRI) to monitor participating firm releases and the program's progress. The TRI is the accumulation of facility-reported information describing their releases to air, water, and land of some 450 chemicals.[3] Although the TRI covers only a small number of facilities and pollutants, it is nevertheless the most comprehensive collection of firm-specific pollution emissions data available. The Program's baseline year for comparison was 1988.

The Program monitored the emissions of 17 toxic chemicals which are listed Table 2-1. The chemicals were selected primarily because of their threat to the environment and public health, potential for high exposure, volume of production and release, and potential for pollution reduction and prevention. These chemicals represented the most widely released and most toxic chemicals in the TRI. During 1988, 1.49 billion pounds of the 17 target chemicals were either released to the environment on-site or transferred off-site to waste management facilities.[4] Combined, they comprised about one-fourth of the total TRI releases and transfers in 1988.

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[1] INFORM. *Toxics Watch 1995*, INFORM: New York (1995).

[2] Environmental Protection Agency. *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, report of the Science Advisory Board: Relative Risk Reduction Strategies Committee to William K. Really, (9/90, SAB-EC-90-021)

[3] EPA has expanded the list each year since 1987. In 1988, the baseline year for 33/50, the TRI accounted for the releases and transfers of about 320 toxic chemicals.

[4] Environmental Protection Agency. *1994 Toxic Release Inventory, Public Data Release*, Office of Pollution Prevention and Toxics (June 1996 EPA/745-R-002).

Table 2-1: 33/50 Program Chemicals[5]

1. Benzene 2. Cadmium and cadmium compounds 3. Carbon tetrachloride 4. Chloroform 5. Chromium and chromium compounds 6. Cyanide compounds 7. Dichloromethane 8. Lead and lead compounds 9. Methyl ethyl ketone	10. Mercury and mercury compounds 11. Methyl isobutyl ketone 12. Nickel and nickel compounds 13. Tetrachoroethylene 14. Toluene 15. 1,1,1-Trichloroethane 16. Trichloroethylene 17. Xylenes

A secondary reason that EPA selected these chemicals was that they represent mostly airborne releases and are regulated by the Clean Air Act Amendments (CAAA). Companies that chose to participate in the 33/50 program would be eligible for the Early Emissions Reduction provision of the CAAA.[6] The provision gives firms additional time to comply with applicable emissions standards if they significantly reduce their emissions before the standards are proposed.

EPA formally announced the 33/50 Program in February 1991. The Program had 3 goals, as seen in Table 2-2. The first goal was a 33 percent reduction (491 million pounds) in releases and transfers of 17 toxic chemicals by 1992. The Program's second aim was a 50 percent reduction (744 million pounds) of releases by 1995. Finally, the Program sought to demonstrate that voluntary reduction programs could achieve targeted reductions faster than could be done by EPA's traditional regulatory approach alone.[7] The 33/50 Program's name derives from its first two goals.

Table 2-2: Goals of the 33/50 Program[8]

Goal Type	Operationalized Goal
• Interim reduction goal	• Reduce 17 TRI pollutants by 33 percent (491 million pounds) by 1992.
• Ultimate reduction goal	• Reduce 17 TRI pollutants by 50 percent (744 million pounds) by 1995.
• General goal	• Show that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods.

[5] Ibid.
[6] General Accounting Office [a]. *Toxic Substances: EPA Needs More Reliable Source Reduction Data and Progress Measures*, (Chapter Report, 09/23/94, GAO/RCED-94-93).
[7] EPA (1996).
[8] Ibid.

Companies that reported using or releasing one or more of the 17 target chemicals were encouraged by EPA to join the 33/50 Program. EPA solicited potential participants by extending invitations to three specific groups of firms, as seen in Table 2-3. The first group was invited in February 1991. This group represented the "Top 600" emitters of 33/50 Program chemicals. These firms were characterized by larger operations and accounted for more than 75 percent of the total 1988 releases and transfers of the 17 target chemicals. More than 60 percent of the "Top 600" companies chose to participate. The second group received invitations to participate in July 1991. This group represented the 5,000 remaining companies that emitted 33/50 chemicals in 1988 (all firms not on the "Top 600" list). The final group was invited to join in July 1992. This group was comprised of 2,500 firms that did not report 33/50 chemical releases in 1988, but did so in subsequent years. The second and third groups were characterized primarily by smaller operations and were less responsive to EPA's solicitation for Program enrollment; about 13 percent of these companies participated.

Table 2-3: Characteristics of Invited and Actual 33/50 Program Participants[9,10]

Group	Firms	Number of Invitations	Invitation Date	Participation Rate
1st invited group	"Top 600" firms	600	February 1991	60%
2nd invited group	TRI reporting firms not on "Top 600" List	5,000	July 1991	15%
3rd invited group	Firms with no 33/50 chemical releases in 1988 but emitted some in later years	2,500	July 1992	12%
Actual 33/50 Participants	*Firms that emitted 63% of all 33/50 chemical releases in 1988*	*8,100*	-	*16%* *1,300 firms*

The Program targeted parent companies, rather than individual facilities. By receiving pledges from the parent company, EPA sought participation from every facility within the company. Of the 8,000 companies contacted, 1,300 parent companies pledged participation. Releases and transfers reported by these companies represented 63 percent of all 1988 releases and transfers of 33/50 Program chemicals and 15 percent of all TRI emissions.[11] Participants pledged to voluntarily reduce 385 million pounds of pollution.

The Program was designed to recognize a company's participation when it submitted to EPA in writing its intention to participate and pledged a corporate-wide numerical reduction

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[9] Ibid.
[10] Arora, S. and Cason, T. "Why Do Firms Overcompiy with Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Discussion Paper 95-38*, Washington DC: Resources for the Future (1995).
[11] Ibid.

commitment for any of the 17 target chemicals through 1995.[12] There were no requirements on the reduction commitments and companies obligated themselves to whatever reductions were appropriate for their firm. Some companies focused their goals on all 33/50 chemicals, while others focused on a specific few, while still others promised to reduce all TRI releases, extending beyond the Program's 17 chemical emphasis.

Participants in the 33/50 Program received support from EPA in several forms. EPA organized regional pollution prevention workshops and conferences. The conferences brought together representatives from industry, government, academia, and public interest groups. They sought to foster an exchange of information on the varying perspectives of pollution prevention. The conferences also promoted collaborative action and partnerships among the conference participants. Further, they showcased companies that were successful at achieving pollution reductions and publicized them in EPA's media relations, documents, and newsletters.

Other support came in the form of technical assistance to 33/50 Program participants. Information was disseminated on emerging pollution prevention technologies for TRI chemicals. In addition, the Agency provided industry-specific guidance, reference manuals, bibliographic reports, and videos covering topics from generic pollution prevention to detailed instructions on setting up waste reduction programs for specific industries, processes, or materials. Finally, the Program also referred companies to training courses offered by states and private sources.

The 33/50 Program continued to accept new companies throughout its tenure, although efforts to actively solicit participation ended in 1994. While the Program's national goals were targeted for achievement by the end of 1995, companies have been encouraged to continue their reductions.

Summary of Program Effectiveness

TRI data have a two-year lag on public release, that is, chemical release data for 1995 are not available until 1997. The lag is due in part to a delay in both company reporting and EPA's compilation of aggregate industry releases. As such, the effectiveness of the 33/50 Program through 1995 cannot be determined until the second half of 1997. For now, the Program can be evaluated through 1994.

The 33/50 Program can be divided into two evaluation areas: fulfillment of the Program's goals (see Table 2-2) and agreement with the goals of the Pollution Prevention Act (PPA).[13] Both areas are evaluated below.

EPA reports that all three of the 33/50 Program's goals have been fulfilled. The Program's interim goal of a 33 percent reduction in the 17 target chemicals was achieved one year

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[12] EPA did not deny participation to any individual facility that wanted to participate, regardless of whether the parent company pledged its participation. This was criticized later by INFORM and GAO because the parent company received credit for participation even if only one of its facilities participated. Also, companies were recognized as Program participants regardless of whether a numerical reduction goal was specified.

[13] Besides these two areas, EPA also evaluates emission projections through 1995. Our analysis omits company reduction projections due to the speculative nature of the estimations.

ahead of schedule and exceeded by over 100 million pounds, as seen in Table 2-4.[14] The Program's ultimate goal of a 50 percent reduction in target chemicals was also achieved a year early. Altogether, the releases and transfers of 33/50 Program chemicals were reduced by 51 percent (757 million pounds) between 1988 and 1994. These reductions represent nearly twice the 385 million pounds initially pledged by participating companies.[15]

Table 2-4: EPA's Evaluation of the 33/50 Program's Goals[16]

Goal Name	Operationalized Goal	Outcome
• Interim reduction goal	• Reduce 17 TRI pollutants by 33 percent (491 million pounds) by 1992.	• Achieved in 1991, one year ahead of the 1992 target date • 590 million pound reduction • 40% reduction of Program chemicals
• Ultimate reduction goal	• Reduce 17 TRI pollutants by 50 percent (744 million pounds) by 1995.	• Achieved in 1994, one year ahead of the 1995 target date • 757 million pound reduction • 51% reduction of Program Chemicals • Reductions represent twice the amount pledged by participating firms
• General goal	• Show that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods.	• 33/50 firms reduced their chemicals at faster rates than non-participating firms • 33/50 chemical reductions were at faster rates than other TRI chemical reductions

EPA reports that the 757 million pound reduction is the minimum amount that Program participants attempted. About one-third of participating parent companies made pledges that extended beyond the Program's scope. For example, some Program participants pledged to continue their reductions after 1995. Other participants claimed a reduction for chemicals beyond the 17 target chemicals. Several multinational corporations, which were not targeted by EPA as potential participants, also pledged their reductions. Others went beyond targeting end-of-pipe releases or transfers by attempting to reduce their actual use of toxic chemicals.[17]

While the 33/50 Program was initiated in 1991, EPA uses 1988 as the baseline year to evaluate the Program's goals. TRI reporting facilities, however, began reducing their emissions of 33/50 chemicals prior to the Program's start; about 83 percent of all facilities began reducing 33/50 chemicals emissions between 1988 and 1991.[18] For this reason, the General Accounting Office (GAO) has criticized EPA for using the 1988 baseline when analyzing the Program's

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[14] EPA (1996).
[15] Ibid.
[16] Ibid.
[17] Companies that focused on chemical reduction did not stipulate the impact such pollution prevention initiatives had on environmental releases of 33/50 Program chemicals.
[18] Citizen Fund. *Pollution Prevention or Public Relations?* Washington, DC: May 1994.

effect.[19,20] GAO argues that only reductions between 1991 and 1994 should be considered when evaluating the Program's progress.

As seen in Table 2-5, the Program's results change substantially when evaluating its first two goals subsequent to 1991. Between 1991 and 1994, 33/50 chemicals have fallen by 204 million tons, representing a 27 percent decrease in target chemicals, as compared to the 51 percent reduction using the 1988 baseline.

Table 2-5: Comparison of Baseline Years and Participant Reductions to Program's Reduction Goals

Goal Name	Reduction Goals and Year	Total Reductions 1988 to 1994	Total Reductions 1991 to 1994
• Interim reduction goal	1992: 33%	40%	12%[21]
• Ultimate reduction goal	1995: 50%	51%	27%

EPA calculates the 33/50 chemical reductions by aggregating all firm reductions. The Agency does not distinguish between reductions that were made by Program participants and non-participants. Thus, reductions that were made by non-participants count towards the Program's goals. GAO estimates that 38 percent of targeted reductions are attributable non-participating companies.[22]

EPA responded to GAO's criticisms by seeking an independent research firm to determine the Program's value. INFORM, a nonprofit environmental research organization, was selected to do the analysis. INFORM's analysis controlled for emissions reductions attributable to non-participating companies.[23] Its findings confirmed GAO's concerns about the Program's weak evaluation measures. INFORM showed that 31 percent of the participants had already initiated reduction activities prior to the announcement of the 33/50 Program.[24,25]

EPA's evaluation of the third goal (the Program's general goal) attempts to separate the contributions participants and non-participants to better capture the Program's affect. The third goal was to demonstrate that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods. EPA shows that between 1991 and 1994, Program participants reduced their releases and transfers of target chemicals by 49 percent, whereas, non-

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[19] GAO[a].

[20] General Accounting Office [b]. *Toxic Substances: Status of EPA's Efforts to Reduce Toxic Releases*, (Chapter Report, 09/22/94, GAO/RCED-94-207).

[21] Reductions between 1991 and 1992.

[22] This estimate is 16 percent higher than EPA's approximation. EPA has recognized that a considerable portion of the reductions reported by the Program were achieved by firms not formally participating in the Program, but the Agency believes the Program's presence influenced some of these firms to reduce toxic releases.

[23] INFORM (1995).

[24] Ibid.

[25] EPA (1996) acknowledges that some of the Program's reductions did result from non-participants. The Agency estimates that about 26 percent of the reductions (196 million pounds) between 1988 and 1991 and 30 percent (82 million pounds) between 1991 and 1994 can be attributed to non-participating firms.

participating companies reduced their emissions of 33/50 chemicals by 30 percent, as seen in Table 2-6.[26] Thus there is a 19 percent reduction difference that may be due to the Program's affect. The reduction difference is also seen when comparing 33/50 chemical releases and transfers to other TRI chemical emissions. Between 1991 and 1994, 33/50 chemical releases and transfesr fell by 42 percent as compared to all other TRI chemical releases which have fallen by 22 percent. Thus Program participants achieved greater reduction quantities in less time than did non-participants.

Table 2-6: EPA's Comparison of 33/50 Program Participants to Non-Participants and 33/50 Chemicals to Other TRI Chemicals[27]

Issue	Years	33/50 Program Participants	Non-participants
• Releases and transfers of Program chemicals	1991 to 1994	-49%	-30%
• Percent of total 33/50 chemical reduction	1991 to 1994	70% of total	30% of total

Issue	Years	33/50 Program Chemicals	Other TRI Chemicals
• Releases and transfers of Program chemicals for treatment and disposal	1988 to 1991 1991 to 1994	-16% -42%	-20% -22%
• 33/50 chemicals in production-related waste	1991 to 1994	- 1%	9%

The PPA focuses on reducing waste at its source, thereby preventing pollution rather than controlling or treating it. When EPA launched the 33/50 Program it emphasized reducing toxic chemicals through source reduction. The extent to which the 33/50 Program has fulfilled the PPA's goals is the second area to evaluate the 33/50 Program's success. The best indicator for a firm's source reduction activity is its variation in production-related waste. A company's production-related waste is determined by aggregating all its recycled, reused, combusted, treated, and released emissions both on- and off-site. It includes all waste management practices other than pollution prevention. When production-related waste falls, source reduction is likely to increase. The 33/50 Program did not require participating firms to reduce their chemical emissions through source reduction. This may be one reason for the marginal changes in production-related waste. Between 1991 and 1994, participating firms have reduced their production-related waste by 1 percent, as seen above in Table 2-6. Non-participating firms, however, have *increased* their production-related waste by 9 percent. So, while source reduction activity is low for 33/50 firms, it still outpaces the activity by non-participants.

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[26] EPA (1996).
[27] Ibid.

Citizen Fund, GAO, and INFORM have all criticized EPA for not following the PPA's emphasis on source reduction.[28] All three organizations argue that the Program's emphasis on source reduction should have been an integral part of its goals and a requisite for participation. Because source reduction was not required, it was not the preferred waste management method. Most companies relied primarily on end-of-pipe treatment technologies or on-site recycling and energy recovery, rather than source reduction, to reduce their releases and transfers of the 17 Program chemicals.[29]

The 33/50 Program's 5-year existence is too short to draw any causal relationships between the Program and emissions changes; only associations can be shown. As such, the reader should regard the results presented above with caution; they are only trends.

Relevance for Industry Incentives

EPA designed the 33/50 Program so that companies would participate for a variety of reasons. The Agency hoped that firms would participate to take advantage of the early emissions reduction provisions in the CAAA. EPA also believed that companies would view participation as an opportunity to gain public recognition for their commitment to pollution management. Finally, the Program was designed to give participants great flexibility in reducing emissions and required few prerequisites to join the Program, thereby minimizing the administrative burden and allowing firms to decide their most cost-effective method of pollution control.

The incentive to participate in order to qualify for credit under the early emissions reduction provision of the CAAA has not been significant, as participation in the Early Reductions Program is limited. In 1994, EPA had only 40 active applications from facilities and had approved 12 for the 6-year extension. The low applicant response may be due to several reasons. First, it is not certain whether 33/50 participating companies knew of the early reduction incentives when they pledged their participation to EPA. The small number of active applications may reflect a limited number of companies having knowledge of its existence rather than lack of interest. A second, reason for the low applicant response may be due the program's extensive qualification requirements.[30] To qualify, facilities must establish base-year emission levels and demonstrate a 90 to 95 percent reduction from those levels. The compilation of base-year data is a difficult process, requiring a significant investment of time and personnel. Consequently, some facilities withdrew their applications to participate in the program once they realized the amount of resources needed to fulfill the program's requirements.[31]

Large firms were more likely to participate in the 33/50 Program. About 60 percent of all participating firms were characterized as being large companies with high quantities of both 33/50 and total TRI chemical emissions. These companies were more likely to have the resources available to invest in pollution reduction activities. Many of these companies began their reduction activities immediately after the announcement of the 1988 TRI data and for the two years prior to the initiation of 33/50. By participating in the 33/50 Program, these companies

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[28] Citizen Fund (1994), GAO [a][b](1994), and INFORM (1995).
[29] INFORM (1996).
[30] GAO[b] (1994).
[31] Ibid.

were able to capitalize on the reductions that they had already made, showcase their concern for the environment, and receive publicity through EPA and their own marketing strategies. For firms that were concerned about their environmental image after TRI data were first made public, the 33/50 Program may have been a vehicle to show their support for corporate environmental management.

Finally, program participant's pollution management focused mainly on emissions control and recycling techniques rather than source reduction. As noted earlier, EPA did not require source reduction activities as a requisite for participation. Yet even without the explicit emphasis on source reduction, firms participating in the 33/50 Program had a greater incentive to reduce waste at the source. While production-related waste has increased, it has been at a smaller rate than waste production for non-participating firms. The Program gave flexibility to its participants and encouraged innovative approaches to pollution control rather than requiring prescriptive standards for waste treatment and disposal. Thus companies could determine their most cost-effective means to reduce emissions which often includes reducing waste at the source. Also, the Program offered industry-specific technical assistance and information on emerging pollution prevention technologies, thereby increasing the likelihood of source reduction.

Arora and Cason (1995) researched the statistical probability of a firm participating during the first two years of the Program.[32] Their analyses show that firms characterized by high customer interfacing were 20 percent more likely to participate in the 33/50 Program, as seen in Table 2-7. The authors speculate that one reason for the increased firm participation is due to a greater proximity to the final customer. EPA marketed the Program as a means for firms to gain public recognition for their responsible environmental management. Those firms whose operations were closer to their final customer were more likely to be able to capitalize on the increased public recognition and participate in the Program.

Table 2-7: Characteristics of Firms Likely to Participate in the 33/50 Program[33]

Firm Description	Increased Probability of Participation
High customer interfacing	20 percent
High R&D intensity	12 percent
Large number of employees	44 percent
High non-33/50 chemical releases	99 percent
High 33/50 chemical releases	22 percent

Arora and Cason also show that firms with larger investments in research and development (R&D) were more likely to participate in the Program. The authors argue that this was because firms engaged in substantial R&D had the capability to devote resources towards

[32] Arora, S. and Cason, T. "Why Do Firms Overcomply with Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Discussion Paper 95-38*, Washington DC: Resources for the Future (1995).
[33] Ibid.

pollution management. R&D increased the likelihood of participation by 44 percent. In addition, the results also show that larger firms had an increased the likelihood for Program participation. This relationship is partially verified by EPA's report of a 60 percent participation rate from larger firms at the Program's close.[34] The authors speculate that larger firms have greater access to resources that could be dedicated towards pollution reduction and Thus they are more likely to participate. Finally, a firm's quantity of chemical emissions, both 33/50 and non-33/50 showed a significant relationship with its likelihood for Program participation even after firm size was controlled. Thus firms with higher chemical releases were more likely to participate in the 33/50 Program.

In closing, while the 33/50 Program appears to have met its goals other factors besides participant reductions have contributed to its success. Reductions made by non-participating firms and reductions made prior to the Program's start have diluted the Program's effect. When controlling for these variables, though, the Program may have resulted in an additional 19 percent reduction in 33/50 chemicals.[35] The Program's flexibility, technical assistance, and publicity may have encouraged these enhanced reductions, although the data that to support the assertion are limited. What is known about firm participation is that larger firms with greater chemical releases were more likely to participate. Also, firms with larger investments in R&D and greater customer interfacing had a greater probability of participating in the Program.

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[34] EPA also reports projections through 1996 which are omitted due to the speculative nature of the estimations; Environmental Protection Agency. *EPA's 33/50 Program Sixth Progress Update, Continuing Progress Toward Ultimate Reduction Goal*, Office of Pollution Prevention and Toxics (9/95 EPA 745-K-95-001).

[35] EPA shows that between 1991 and 1994, Program participants reduced their releases and transfers of target chemicals by 49 percent, whereas, non-participating companies reduced their emissions of 33/50 chemicals by 30 percent, as seen in Table 2-6. Thus there is a 19 percent reduction difference that may be due to the Program's affect.

5. OSHA's VOLUNTARY PROTECTION PROGRAMS

Introduction

The Occupational Safety and Health Administration's (OSHA) Voluntary Protection Programs (VPP), adopted on July 2, 1982, are voluntary, cooperative agreements among labor, management, and the federal government. The VPP's purpose is to recognize and promote excellence in employer-provided occupational safety and health management. The primary goal of participation in OSHA's VPP is reduced workplace injuries and illnesses. Other intended benefits of the program include employer financial savings, improved employee morale, enhanced ties with the regulator and employees, and increased production, presumably the fruit of improved employee morale and fewer lost employee workdays.

There are three VPP programs: Star, Merit, and Demonstration. The Star program is the most demanding program of the three. OSHA's Star program requirements are based on the most comprehensive safety and health programs used by American industry. The program aims to recognize leaders in injury and illness prevention programs who have been successful in reducing workplace hazards and to encourage others to such success. In order to be eligible for the program, a general industry applicant (non-construction applicant) must have an average of both lost workday injury case (LWDI)[1] rates and injury/illness incident (II)[2] rates for the most recent three year period at or below the most recent specific industry average published by the Bureau of Labor Statistics (BLS). Requirements for an application from a firm in the construction business are slightly different. The LWDI rates and II rates must be at or below the national average for that type of construction. Star participants are expected to demonstrate continuous improvements in LWDI rates and II rates during their triennial evaluations.

A site's[3] safety and health program must satisfactorily address the following areas in order to qualify for the Star program: management commitment and planning, hazard assessment, hazard construction and control, safety and health training, employee participation, and safety and health program evaluation. By addressing these areas, employers have the opportunity to go beyond standards set by OSHA to provide the best possible safety and health protection at a site. Employers who are approved for VPP participation are removed from routine inspection lists. This frees OSHA's inspection resources for visits to establishments that are less likely to meet the requirements of the OSHA standards. If problems do arise, OSHA and VPP participants address them cooperatively. VPP does not diminish in any way employer/employee rights or responsibilities under the Occupational Safety and Health Act of 1970.

The Merit program is aimed at employers in any industry who do not yet meet qualifications for the Star program but who wish to work toward Star program participation. An applicant will be admitted to the Merit program if OSHA determines it has demonstrated the commitment and potential to achieve Star status. The Merit program is open to sites with injury

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[1] Lost workday injury/illness (LWDI) rate refers to the number of lost workdays through occupational injury or illness per 100 employees.

[2] Injury/Illness incident (II) rate refers to the number of occupational injuries/illnesses per 100 employees.

[3] A site may be defined as the geographical location of a facility or set of facilities. A facility may be defined as one or more buildings at a site associated with the same activity or function.

rates worse than the industry's national average. The Merit program is used to set goals, that when achieved, will qualify the site for Star participation. A site will be approved for Merit status if it is expected to reach Star status.

The Demonstration program provides the opportunity for companies to demonstrate the effectiveness of alternative methods which, if proven successful, could be substituted as alternative qualifications for the Star program in certain situations. It is also an opportunity to experiment with safety and health programs in industries, such as maritime and agriculture, not traditionally associated with such programs. It also provides a vehicle to test ways to overcome problems that may have discouraged small businesses from participating in the VPP.

As of May 1, 1996, there were 231 participating worksites in the VPP -- 191 in Star, 37 in Merit, and 2 in Demonstration.[4] 98 different companies are enrolled in VPP.[5] There are more worksites than companies participating in the VPP because many companies are represented by more than one worksite. International Paper has the highest number of participating sites, 17.[6] Occidental Chemical and Mobil Chemical are second and third with 12 and 10 participating sites respectively.

Participating worksites involve more than 203,850 workers. This is less than one-half of 1% of the workers in the mining, construction, manufacturing, transportation and utilities, wholesale trade, and hospital industries.[7] This is approximately 1% of the workers in just the manufacturing industry. 207 of the 231 (87%) participating worksites are from manufacturing.[8] 73 (32%) of the participating worksites are from the chemical manufacturing industry.[9] Only 3 of the 98 participating companies fit the traditional definition of a small business -- no more than 500 employees in a company. The primary reason for lack of small business representation is that most small businesses simply do not have the resources necessary for participation.

The Occupational Health and Safety Act of 1970 (29 USC 651) provides the statutory framework for OSHA's VPP. It was enacted "to ensure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." Section 2(b) of this act specifies the means Congress intended OSHA to use to implement these goals:

> (1) by encouraging employers and employees in their efforts to reduce the number of occupational and safety health hazards at their places of employment, and to stimulate employers and employees to institute new and to perfect existing programs for providing safer and healthful working conditions."
>
> (4) "by building upon advances already made through employer and employee initiatives for providing safe and healthful working conditions."
>
> (5) "by developing innovative methods, techniques, and approaches for dealing with occupational and safety health problems."

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[4] Occupational Health and Safety Administration. *Voluntary Protection Program Facts*, May 1, 1996, p.1.
[5] Ibid.
[6] However, this is just over 4% of the 400 or so Weyerhaeuser sites eligible for entry into the VPP program.
[7] This figure is based on 1994 employment data, provided by the *1995 Statistical Abstract of the United States* published by the US Department of Commerce, for the aforementioned industries, the types of industries participating in OSHA's VPP.
[8] These figures are calculated from OSHA's 1995 VPP data base.
[9] Ibid.

(13) "by encouraging joint labor-management efforts to reduce efforts to reduce injuries and disease arising from employment."

A commonly asked question about VPP is: aren't OSHA's standards sufficient to accomplishing all the goals established by the act? OSHA believes compliance with its standards alone is not sufficient to accomplish the goals established by the act. Standards, no matter how carefully conceived and properly developed, will never cover all unsafe activities and conditions. In addition, limited resources will never permit regular or exhaustive inspections of all the nation's workplaces. It is employers and employees with their daily experience in the workplace that have an intimate knowledge of all the processes, materials, and hazards associated with a particular industry. This knowledge, combined with the ability to evaluate unique hazards quickly, allows employers and employees to improve workplace safety in ways simply not available to OSHA.

How effective has the VPP been?

Evaluating the effectiveness of OSHA's VPP programs is difficult. OSHA states that the purpose of the VPP is to emphasize the importance of, encourage the improvement of, and recognize excellence in employer-provided site-specific occupational safety and health programs. OSHA's VPP certainly does these things. However, the ultimate question of whether OSHA's VPP brings about significant improvements in the safety and health records of our nation's worksites is more difficult to determine.

One reason for the difficulty in assessing the effectiveness of OSHA's VPP is the paucity of data on the safety performance of companies before and after they entered the VPP. Both OSHA and the Voluntary Protection Programs Participants' Association (VPPPA), a private non-profit group of VPP members that helps OSHA publicize and support voluntary protection, have some data on the performance of companies after they entered VPP, but they possess very little data about a company's performance before entering the program. As a result, it is almost impossible to ascertain whether the significant improvements in LWDI rates and II rates that OSHA and VPPPA present were actually due to participation in the program, were simply the continuation of a trend, or were greater when a participating company was outside the program.

For instance, the Thrall Car Manufacturing Company in Winder, Georgia decreased its LWDI rate from 17.9 in 1989 when the facility began implementing a VPP quality safety and health program to 4.6 in 1992 when the plant was ready to qualify for the Star program.[10] No data is given to indicate what the LWDI rates were before Thrall's entry into the VPP in 1989. The decreases occurring from 1989-1993 may very well have been the continuation of a trend.

A second consideration is that two of the criteria for acceptance into the Star program are decreases in II rates and LWDI rates over the preceding three years. If a company is achieving reductions in these safety and health indicators even before official entry into the program, then it is difficult to determine whether VPP pushed a particular company to improve their safety and health programs or whether this was occurring anyway and the company simply wanted recognition for it.

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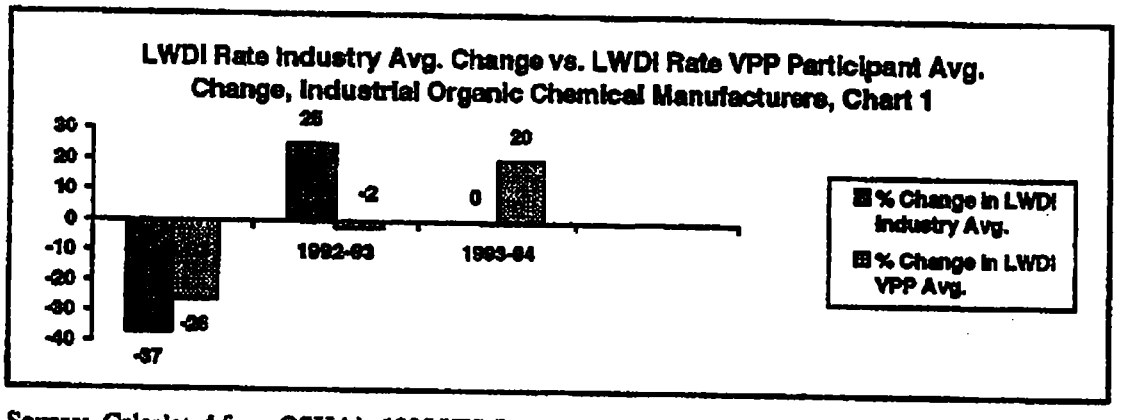
[10] Voluntary Protection Program Participants Association (VPPPA), "Benefits of VPP Participation: Data from VPP Sites", June 1996.

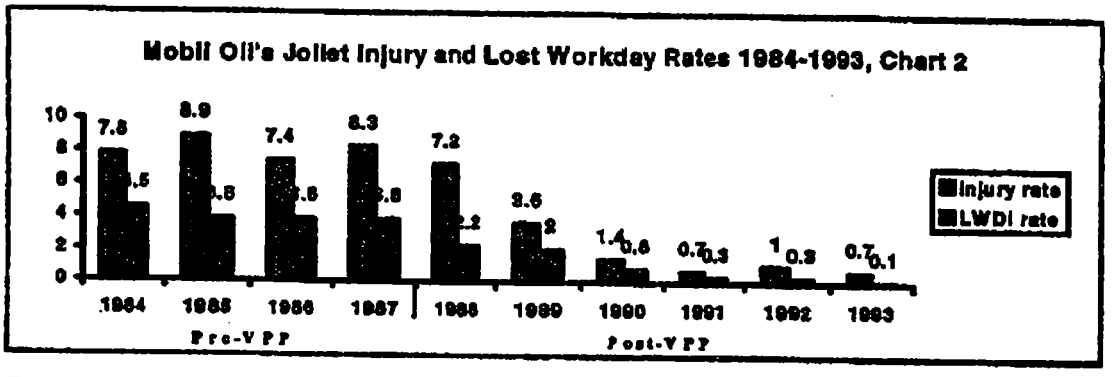
Even a comparison of the percent change in LWDI rates and II rates of companies participating in the VPP with their industry average doesn't reveal much about VPP's impact. The most represented industry in the VPP, manufacturers of industrial organic chemicals, saw average industry II and LWDI rates change more favorably than the average II and LWDI rates of VPP participants for 2 of the 3 years for which data was available (See Chart 1). It is likely that, with the improvement occurring in safety and health performance throughout industry, the industry II and LWDI average are likely to be improving more rapidly than the average of VPP participants in many industries, not just in the industrial chemical manufacturing industry. This reality makes assessing OSHA's VPP quite difficult.



Source: Calculated from OSHA's 1995 VPP Data

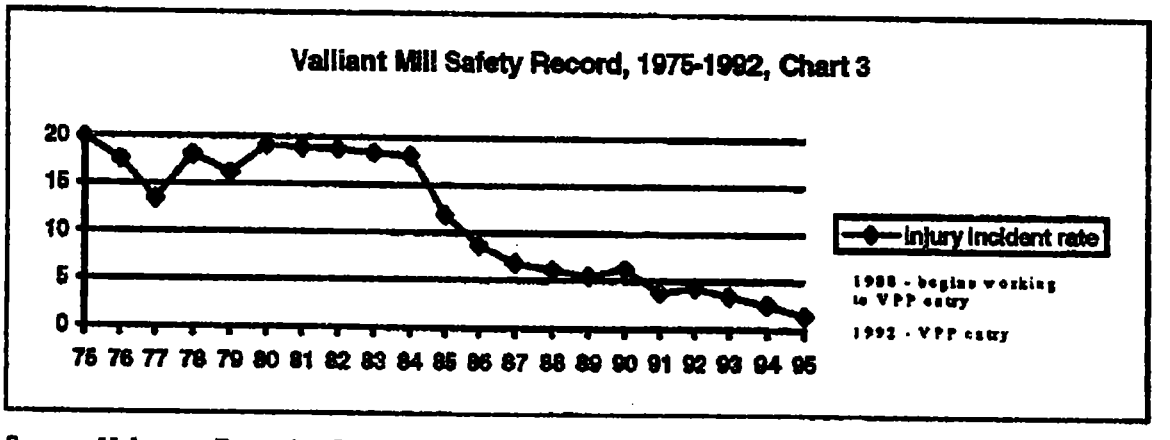
Note: Positive numbers indicate a worsening safety performance. Negative numbers indicate an improving safety performance.

With all this in mind, OSHA and VPPPA do provide some data which indicates that the VPP does improve a site's safety and health performance. Mobil Oil's Joliet, Illinois refinery's LWDI rates from 1983-1987 were 4.5, 3.8, 3.8, and 3.8 respectively. Mobil believed its safety program had "plateaued". It was dissatisfied with this performance and wanted to see improvement. In 1988, the Joliet refinery began implementing VPP safety and health programs. Following OSHA's VPP framework, Joliet increased employee involvement and top management participation and improved documentation which allowed Joliet to refine its safety and health program. By 1993, two years after its approval to the Star program, its LWDI rate was 0.1 (See Chart 2).



Source: Voluntary Protection Program Participant's Association. "Benefits of VPP Participation: Data from VPP Sites," 1994.

The Weyerhaeuser Paper Company provides another good example of how the VPP improves a site's safety and health performance. Valliant Mill, producers of pulp and paper container board in Oklahoma, like Joliet, believed its safety and health performance had "plateaued" in 1988. As a result, Valliant began using OSHA's expertise in an attempt to qualify for the VPP and to further improve its safety and health performance. In 1992, OSHA approved Valliant for the Merit program. 1994 witnessed Valliant's entry into the Star program. Even though Chart 3 seems to indicate improvements were already occurring before Valliant's VPP association, Roger Strain, Valliant's safety and health manager, maintains further improvement probably would not have occurred without OSHA's expertise.



Source: Voluntary Protection Program Participant's Association. "Benefits of VPP Participation: Data from VPP Sites," 1994. Roger Strain, Safety and Health Manager of Valliant provided data from 1993 to 1995.

Why do some sites participate and not others? Companies generally leave site participation to the discretion of local site managers. Sites that do not participate generally believe that VPP uses too much time and too many resources to be worthwhile. However, the sites that do participate believe the benefits outweigh the costs. The benefits of participation will be discussed in the following section.

What are industry's incentives for participating in VPP?

There are a number of reasons for the participation of companies in OSHA's VPP. One reason for VPP participation is the recognition it brings to companies. Companies are always looking for a competitive edge. Some companies believe VPP participation enhances their image in the eyes of their customers. For instance, many of the customers of Fisher Controls, manufacturers of rotary and ball control valves, are companies that also participate in the VPP. Fisher believes its participation in the program increases its attractiveness to potential buyers of its products.

A second reason for VPP participation is that OSHA provides a set of fresh, independent eyes to inspect a site's safety and health program and to evaluate its quality. OSHA provides external validation that a company's safety and health program is operating effectively. OSHA inspects Star participants once every three years. If a participating Star site has been inspected once and is in good standing, OSHA performs subsequent inspections as infrequently as once every five years. OSHA's VPP onsite inspections are more frequent and more thorough than OSHA's programmed compliance inspections, which occur as infrequently as once every 20 to 30 years. OSHA's VPP onsite inspections require safety specialists and industrial hygienists to spend up to two days to exhaustively examine the worksite to identify the types of hazardous conditions that might exist. Some companies insist that one motivation for entering the program is subjecting the site to OSHA's expert evaluations. The evaluations usually result in recommendations that lead to refinement of a company's safety and health program.

The fact that more time and resources seem to be spent scrutinizing Star program participants, the best examples of excellence in safety and health performance in industry, than other companies seems to indicate that OSHA's priorities may be misplaced. However, it is important to realize that OSHA's average programmed inspection time period of 20 to 30 years per company is misleading. OSHA inspects the most hazardous companies, which it determines based on injury and illness rates, far more frequently, as often as every couple of years. In addition, no companies are exempt from OSHA's investigation of employee complaints. One aspect of the Star program which is appealing to Star participants is the fact that any situation that involved employee endangerment would be resolved cooperatively with OSHA. OSHA's inspectors would not storm a company's property or take any enforcement action unless cooperation did not resolve the problem.

OSHA justifies their use of resources in this way by pointing out that the direct impact of VPP evaluations is greater than OSHA compliance inspections. What is the evidence for this? OSHA data show that an average of 91 employees are covered by each OSHA compliance inspection; an average of 756 employees are covered by each VPP onsite evaluation. Every hour of OSHA compliance activity covers 3.0 employees; every hour of VPP activity covers 8.3 employees.[11] However, one could argue that the impact of OSHA compliance inspections, even if they target fewer employees per inspection, might very well be more important because a typical OSHA site has much greater room for improvement than a Star site which by definition is supposed to be among the best in its industry.

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[11] Catanzaro, Gerry. "Answers to Some Frequently Asked Questions on VPP", *Job Safety and Health Quarterly*, Summer 1994, p. 22.

A third reason for VPP participation is that it allows companies to have a good relationship with the regulator. Working cooperatively with the regulator means a company's views and concerns are more likely to be incorporated during formulation of regulations and enforcement guidelines. Companies have gradually come to realize that OSHA's commitment to cooperation is genuine. This in part accounts for the increase in company VPP participation from 51 in 1995 to 98 in 1996. Cooperation is a contrast to the adversarial relationship that often typifies OSHA/industry relations.

The VPPPA cites employee benefits as another incentive for participation in the VPP. VPP participants report higher morale among employees, increased productivity, decreased absenteeism, and an increase in the quality of production. Unfortunately, VPPPA provides little data to substantiate these claims. For example, VPPPA points out that the Ford New Holland Plant in Grand Island, Nebraska experienced a 13% increase in productivity and a 16% decrease in scrapped product that needed to be reworked during its first three years in the VPP.[12] Nothing is mentioned about what levels of productivity increases and scrapped product decreases were before entry into VPP. They may very well have been greater. Also, it is possible that the productivity increases were due to other factors such as improved technologies or management strategies.

A final and perhaps most important reason for VPP participation is its impact on a company's bottom line -- its profits. OSHA's inspections, program requirements, and evaluations of VPP participants, though only partially responsible, are almost certainly due some credit for reducing II and LWDI rates. The decline in II and LWDI rates enable these sites to have lower worker compensation premiums and insurance rates. So not only is the workforce benefited with safer working conditions, but a company's competitiveness is enhanced.

For instance, the Monsanto Chemical Group in Pensacola, Florida reported workers' compensation costs of $168,000 in 1989, the year of its VPP approval. Four years later, the facility experienced workers' compensation costs of $87,000.[13] Mobil Oil Corporation's Paulboro, New Jersey Refinery experienced even more dramatic savings. Mobil Oil Paulboro reported worker's compensation costs of $200,000 in 1991, and costs of $22,000 in 1994, the year the facility was approved into the VPP.[14] Again it is important not to interpret this data out of context. Certainly, companies don't need OSHA's VPP to look out for their profit margin. They probably would have achieved most if not all these reductions on their own without VPP. However, OSHA's VPP does provide an extra set of eyes, a forum for recognition of safety and health excellence, and an opportunity to develop a cooperative relationship with the regulator.

Policy Implications/Lessons for Future Initiatives

What is to be learned from this look at OSHA's VPP? One lesson is that even a program that's almost 14 years old and that seems to save companies money and provide other benefits, still has a very low participation rate. One reason for this is that many companies believe they

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[12] VPPPA.
[13] Ibid.
[14] Ibid.

have excellent safety and health programs already, so the cost in time and resources of participating in OSHA's VPP does not justify the marginal benefits.

A second lesson from the program is that it is difficult to get small companies to participate in the program primarily because they lack the resources of the larger companies. Yet it is the smaller companies, because of their lack of resources to develop extensive safety and health programs, that most often need the expertise that the VPP is able to provide.

A third lesson is that there is no perceived need on the part of OSHA to provide convincing evidence that the program is working; self-evaluation is not a part of its culture. OSHA does provide some data which it believes validates the program to some extent. However, the data OSHA presents, as discussed earlier in this paper, is not convincing. OSHA presents little data on the performance of companies before they entered the VPP, so the impact of the VPP on these company's LWDI and II rates is unclear.

7. GENERAL CONCLUSIONS

Program Evaluation

The most important conclusion about the federal programs examined is that four of the five programs (SO_2 emissions trading is different in almost every way from the other four programs) are peripheral, both to business and society. They do not address most of the important problems with the pollution control system nor do they contribute significantly to improving environmental quality.

OSHA Star and the programs related to it have succeeded in establishing a positive image, but it is very debatable whether the programs have made any major contribution to occupational safety and health. OSHA has no information to support such a contention. Of the few companies we talked to who had facilities participating in the OSHA program, some thought the Star program contributed to improved worker safety, others did not think so. From the perspective of OSHA, the programs allocate scarce resources to the facilities that least need it. From the perspective of participating companies, the programs improve the working relationship with OSHA, but most companies hardly ever see an OSHA inspector anyhow.

XL and CSI may be too new to evaluate with any certainty, but there is no indication that either program will make a major contribution to environmental improvement or to lowering the cost of the pollution control system. Both programs have contributed to improved communications among the interested parties, but the other side of this coin is the high transactions costs of participating in either program. As of this writing, it seems quite possible that the high transactions costs and low pay-offs will result in the demise of one or both programs.

33/50 is quite different from XL and CSI in that the transaction costs of participating were close to zero. The minimal threshold for participation and the looseness of the criteria for success make it difficult to know how much impact 33/50 had. It has met its goals, and the group hired to impartially evaluate the program believes that the existence of the program did contribute to the reduction in toxics that was achieved. A number of industry people believe that the program was instrumental in reducing toxics emissions. However, it is debatable whether a program like 33/50 could be successful today.

It is worth examining why the three EPA programs have not achieved more. We think there are three major reasons: 1) the lack of a statutory base; 2) EPA management; and 3) pervasive mistrust.

The pollution control system, to an even greater degree than most government programs, is driven by legislative mandates. What gets done, when it gets done, and how it gets done are all determined by the statutes and the litigation that follows the statutes. It is therefore very difficult to make any non-statutory program work. Decisions are difficult to reach, because in the absence of statutory authority consensus must be the mode of decision-making. Business participants steer the programs to peripheral matters because their general counsels caution them against taking any action that might result in litigation, and EPA cannot provide protection against third-party suits. EPA personnel give the non-statutory programs low priority because most of their effort is devoted to meeting requirements set by Congress and the courts.

We do not have enough information to pass judgment on EPA's management of the programs. However, there is good evidence that for all three programs the advanced planning in EPA was inadequate. This made less difference for 33/50 than for CSI and XL. For the latter two, the agency seemed uncertain about what it wanted to accomplish or how it planned to do it. Also, because the agency is organized and structured to implement statutes, the organization to implement the non-statutory programs is ad hoc and not well coordinated with the rest of the agency.

Pollution control efforts are generally characterized by mistrust and paranoia. Each of the major elements—business, enviros, EPA, the states, Congress—tends to think that the other elements are intent on undermining the public interest and that these other elements have a major advantage in whatever battles take place. In this climate, programs that depend for their success on cooperation, voluntariness, and trust do not fare well.

The SO_2 emissions trading program has been successful in lowering compliance costs, although it is difficult to separate the effect of the trading provisions from the effect of the other SO_2 provisions in the 1990 CAAA. At the least, it can be said that flexibility in meeting standards sharply lowers the cost of meeting the standards, and that trading can be an important component of flexibility. As with XL and CSI, SO_2 trading is a relatively new program, and a much more definitive evaluation will be possible in the future.

A final important note with regard to evaluation is the inadequacy of efforts by the responsible agency to evaluate the success or failure of the programs. 33/50 is an exception to this—in response to criticisms of the program by GAO and others, EPA did build in an ongoing evaluation of the program. But the other four programs lack such capability. If the agency, Congress, and the public are supposed to learn something from these programs then it is essential that the implementing agency provide a neutral ongoing evaluation. In the absence of such evaluation, judgments about the program will be based on politics and the skills of the spin doctors—not an effective basis for making public policy.

Business incentives

Just as it is difficult to find a regulation that fits all firms, it appears that there is no single incentive that appeals to all businesses. In fact, it is difficult to find a voluntary federal initiative that appeals to business at all. Four of the five initiatives we examine are largely voluntary programs. Some of the OSHA VPP is codified, but participation is not mandatory. The sulfur dioxide program, established under Title IV of the Clean Air Act Amendments, is an exception and thus participation rates cannot be used as a proxy to test whether the incentives under the program are attractive to business.

Our analysis of participation rates under the four voluntary federal programs studied show that the initiatives tend to attract very few businesses. Of the four initiatives, 33/50 has attracted the most participants, followed by OSHA Star. Of the 8,000 manufacturers invited by EPA to join 33/50, about 14 percent signed on. Similarly, there are about 98 companies with 231 work sites enrolled in OSHA's VPP program. Only ten facilities of extremely large U.S. market-leaders are implementing XL project plans. About 20 companies participate in CSI.

Table 7-1 shows that the different federal initiatives tend to feature different types of business incentives. Incentives depend in part on the goals of the program and types of firms that are targeted. For example, the goal of the emissions trading program is to lower the cost to firms of complying with sulfur dioxide reduction requirements of the Clean Air Act Amendments. To achieve this, the program targets a relatively narrow group of similar firms that emit large amounts of the substance, and are thus comprise a potential market of buyers and sellers of emissions.

As Table 7-1 illustrates, the SO_2 emissions trading program offers participants the most tangible economic benefits. Direct financial incentives under the program include both market emissions trading provisions, as well as greater flexibility in how firms may achieve reductions. In contrast to the sulfur dioxide program, 33/50 is designed to provide participants with greater public recognition. OSHA VPP is advanced as an excellent way to improve relationships with regulators. As originally conceived, CSI was designed to appeal to some firms that sought to improve relationships with suppliers and with other firms in a sector.

Table 7-1

Business Incentives Contained in Five Federal Initiatives						
	Direct financial	Indirect financial	Public recognition	Regulatory relations	Corporate customer relations	Public customer relations
33/50			X			X
OSHA Star				X	X	
SO_2 Trading	X					
CSI		X			X	
Project XL		X				X

Because the goals and the incentives under the five initiatives vary, business participants offer different reasons for selecting particular programs. 33/50 and OSHA Star both appeal to companies because the initiatives tend to dovetail with internal company programs. Firms also are attracted to clear, demonstrable goals. 33/50's emission reduction goals that are gauged by the Toxics Release Inventory rate highest in this regard. Firms also are attracted to tangible rewards such as OSHA Star's decreased oversight and reporting provisions. Firms also prefer simple initiatives. 33/50 requires companies to do little more than sign a letter and a pledge to try to work toward program goals.

The experience with 33/50 demonstates two important general themes. First is the importance of simplicity. When EPA tried to initiate a follow-up program but with additional checks and controls, potential industry participants balked at the controls and declined to participate. The program never got underway. The second theme gets to the reason for initiating such controls. Environmental groups had misgivings about 33/50 because of the lack of any controls, and some groups argued for third-party audits to check on the results achieved by facilities. The enforcement office in EPA similarly was uncomfortable with a program in which compliance could not be enforced through litigation. There is a fundamental conflict between the business community's desire for flexibility and simplicity and the environmental community's

desire for certainty and enforceability. Lack of trust underlies the environmentalist perspective and until some way can be found to increase mutual trust the fundamental conflict will remain.

CSI and Project XL are generally unappealing to most businesses because they require company employees to attend numerous meetings, draft lengthy plans and progress reports, and solicit public input. Also, because CSI and XL depart so significantly from the existing regulatory system, non-participants perceive the probability of success of these two initiatives as fairly low. Still, for a handful of business, CSI and XL's potential payoff are great enough to warrant the time and resource commitments. XL participants are attracted to the potential for innovative regulatory flexibility and the chance to solve problems creatively.

In summary, while the federal initiatives we examined may tell us whether the program provided appealing incentives for the targeted industry, they cannot tell us whether such incentives work for all businesses. For example, 33/50 targets large manufacturers that emit and transfer large amounts of toxic emissions. It is unclear whether such a system would appeal to small service industries whose emissions tend to fall below TRI reporting thresholds. Similarly, the direct financial incentives offered under the emissions trading program targets a fairly narrow group of firms that emit large amounts of sulfur dioxide. It may be more difficult to use emissions trading schemes in cases where one facility tends to account for most of the major releases of a certain type of pollutant, or where there are a large number of small sources.

Thus far, our discussion assumes that federal regulatory agencies have the ability to devise and implement programs that provide significant business incentives. Even if there were conclusive data to isolate what incentives among the federal initiatives works best, business would still have to agree that federal regulatory agencies are the best source of such incentives. While there is currently little agreement on what types of federal initiatives work best, there is even less agreement among business whether the federal government should administer such programs.

Many businesses want state agencies to have greater authority for crafting and administering initiatives. Some smaller businesses do not want initiatives, but simpler reforms, such as one-stop permitting schemes. In contrast, some large, multinational corporations seek incentives that help them to compete in a global economy.

The diversity of viewpoints is not merely a function of the diversity of business. Even business associations which share similar goals and company characteristics, such as GEMI, have difficulty agreeing on what types of incentives are most desirable.

While it is difficult to state with any certainty what types of business incentives are most desirable, the five initiatives do illustrate what *program* features business find most appealing. It appears that simplicity is the rule. Attractive programs and initiatives such as 33/50 and OSHA VPP tend to mirror ongoing EHS programs within firms. Business also prefers initiatives with clear goals and objectives. Initiatives that require significant employee time and other resource commitments are not as appealing as initiatives such as 33/50 which require little more than a corporate signature and good faith efforts to meet program goals.

For the handful of firms that want to commit company hours and budgets to intensive programs such as CSI and XL, regulators should give them the opportunity to do so. But in

doing so, regulators also must understand that unless such bold initiatives deliver demonstrable results, most businesses will prefer to invest their time and effort elsewhere.

Lessons for the Future

There is widespread discontent with the existing regulatory system. This can be determined by talking to almost any of the regulated or any of the regulators, and it is highlighted by the peculiar phenomenon of the EPA Administrator putting the highest priority on agency efforts to circumvent the basic statutory system that is supposed to govern the agency's actions.

There is not a consensus on how to change the existing system. Although there is agreement on some abstract principles, e.g. there should be more flexibility and greater efficiency, the agreement breaks down as soon as specific measures are proposed. Even among large corporations, there is disagreement over such basic questions as whether existing standards should be maintained and whether standard-setting should be decentralized to the states.

Given the lack of consensus, if the badly broken pollution control system is to be mended it will have to be done through some problem-solving negotiating mechanism. It so happens that the Founding Fathers in their great wisdom provided just such a mechanism in the form of the U.S. legislative system. A basic conclusion to be drawn from our look at the administrative attempts at reform is that there is no short-cut, no way around the difficult task of trying to legislate a better system.

There are a few other lessons that are worth reiterating here, in part because they are simply elements of good public administration and are thus applicable to any program that EPA or OSHA might undertake:

- More advanced planning about the goals and procedures of the programs would have saved a lot of mistakes and delays at later stages;
- Clear goals and simple procedures are major assets of a program and are important incentives for business participation;
- There should be agreed-upon measures to document program accomplishments and progress;
- The lack of program evaluation efforts impedes efforts to draw the correct lessons from a program and leaves it vulnerable to any politically convenient interpretation.

Industries of the Future

The Industries of the Future strategy creates partnerships between industry, government, and supporting laboratories and institutions to accelerate technology research, development, and deployment. Led by the Office of Industrial Technologies within the Department of Energy's Office of Energy Efficiency and Renewable Energy, the Industries of Future strategy is being implemented in the seven energy- and waste-intensive industries listed below.

These industries use more than 80 percent of the energy consumed in all U.S. manufacturing. Two key elements of the strategy include an industry-driven document outlining the industry's vision for the future and a technology roadmap to outline the technology that will be needed in order to reach their goals. Through this process, government-funded research is brought to a sharp focus to benefit U.S. industry. To the extent that visions and technology roadmaps have been completed, OIT has outlined research needs.

Industries of the Future Overview Briefing

Aluminum - Works in the refining of alumina to the fabrication of a broad range of products from beverage cans to aircraft and construction materials.

Chemicals - Produces over 70,000 different products ranging from basic commodity chemicals, such as sulfuric acid and plastics, to mass-marketed consumer goods such as drugs, detergents, and paints.

Forest Products - Produces wood and paper products for a wide variety of consumer goods, such as stationery and paper tissues, and industrial products, such as cardboard packaging and paper for newsprint.

Glass - Produces and fabricates a diverse set of products: flat glass, largely used for windows; glass containers, such as for bottles; fiberglass for insulation and structural applications; and specialty glass, such as optical fibers.

Metalcasting - Melts and casts mostly scrap metal into literally tens of thousands of intricately shaped metal parts that are used in the assembly of over 90% of all durable goods and in virtually 100% of machine tools, manufacturing machinery, and similar capital goods.

Petroleum - Converts crude oil into fuels and feed stocks used in a wide range of products for transportation, industry, electrical generation, and heating.

Steel - Makes, shapes, and ships steel products, one of the most basic and widely used metals, to many markets such as construction, automotive, and machinery.

Agriculture - New team which is focusing on renewable bioproducts and the food processing industries

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United States General Accounting Office

GAO

Report to Congressional Committees

June 1997

GLOBAL WARMING

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

GAO/RCED-97-163

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United States
General Accounting Office
Washington, D.C. 20548

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

[1]The 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.)

[2]Greenhouse 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.

[3]According 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.

[4]EPA refers to it as WasteWi$e.

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

[5]According 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.

[6]This 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

[7]Although 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.

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

[9]Environmental 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.

[10]Such 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.

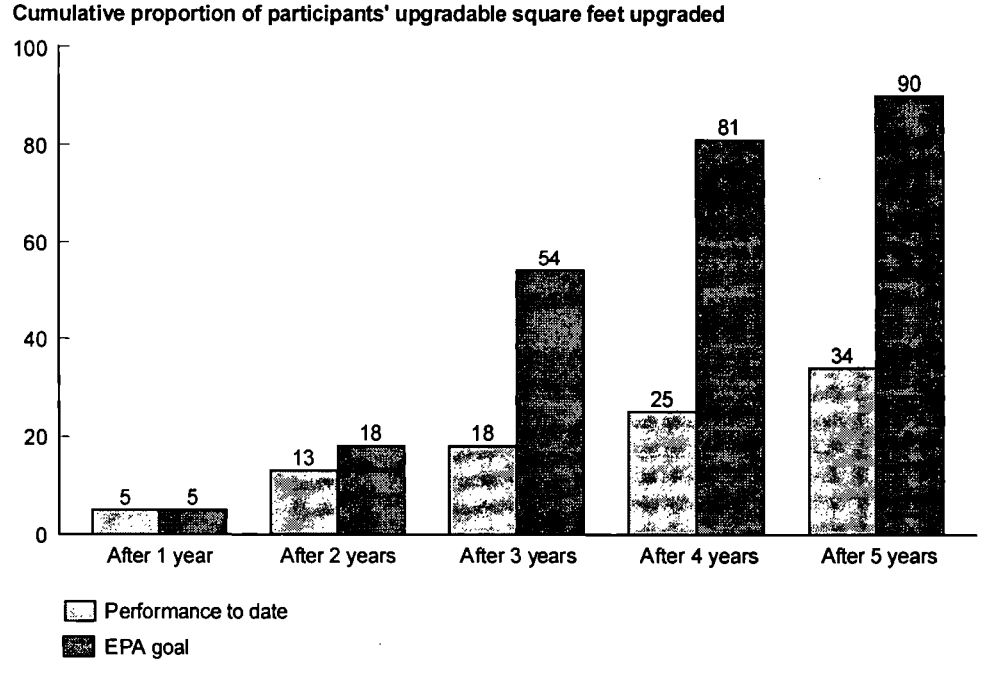
Green Lights Program

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)

[11]Gretchen 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

Contents

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

[a]The 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.

[b]Represents number of projects.

[c]Data for the Source Reduction and Recycling Program are for fiscal year 1995.

[d]Represents "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:

See comment 1.

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.

See comment 2.

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 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.

(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 ion 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

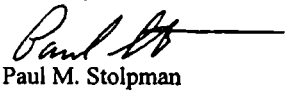
programs are improving through time, and does not believe that the forecasted program impacts are optimistic. As mentioned previously, the program impact is increasing rapidly: 40 percent of the program's current accomplishments have been generated by upgrades that were reported within the last year,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

See comment 6.

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

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

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.

Major Contributors to This Report

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Office of the General Counsel	Karen Keegan

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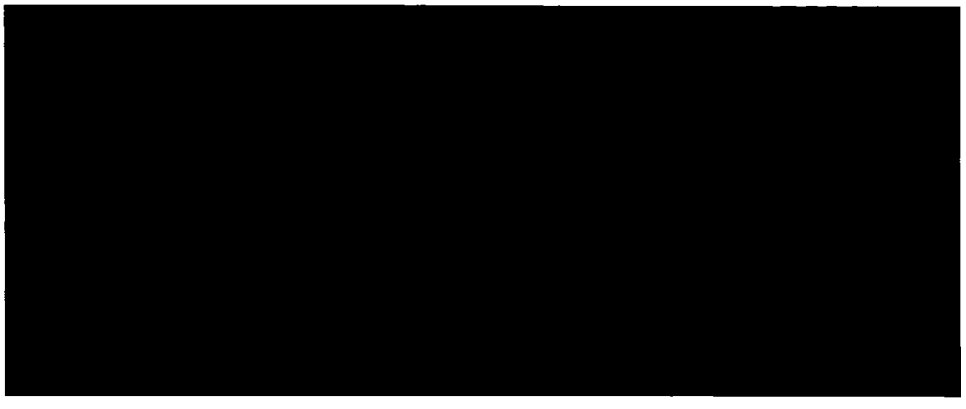


EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

SENIOR ECONOMIST

7 August 97

MEMORANDUM FOR TODD STERN

From: Rosina Bierbaum
Jason Shogren JS

RE: Voluntary programs for climate change

Background.

You asked for information on the existing voluntary programs to reduce greenhouse gas emissions. Here is our initial response based on a quick review of the literature. If you wish, we can get more detailed information or arrange for briefings.

The Climate Action Plan (CCAP) put into place by the USG in 1993 consisted of over 40 voluntary actions across most sectors: residential and commercial buildings, industry, transportation (only a few), energy supply, forestry, and land-use changes. These CCAP actions were projected to reduce emissions by 108 million metric tons of carbon (MMTC) by 2000, enough to return US emissions to 1990 levels (if energy prices had remained high and the US economy had not grown so vigorously). In the US National Communication (required by the framework convention) released yesterday by the State Department, USG now estimates that CCAP will reduce emissions by 76 MMTC in 2000. To date, however, the best DOE and EPA guess is that today these programs have achieved over 15 percent (12-14 MMTC) of this revised goal.

Two factors that have limited the effectiveness of CCAP are: (1) funding levels have been at about 50 percent due to Congressional opposition; and (2) the energy prices have fallen more than expected. Also 11 of the 44 programs have been terminated.

How well have the voluntary programs worked thus far?

- **CCAP**. There has been little evaluation of the effectiveness of the CCAP program. In June, GAO released its review of four EPA's voluntary climate change programs. GAO concluded that "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 with the fourth program (the coalbed methane outreach program)." One page summaries of the four programs are attached. Participation rates have fallen behind expectations.

- **Other voluntary programs**. For other environmental issues, a recent review of several voluntary industrial programs concluded: "we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system." The programs that seem to have worked had relatively simple and clear objectives understood by both the government and business; enabled participants to have a major voice in the establishment of goals; and granted significant flexibility for implementing program objectives. In general, these programs mandate performance goals rather than technology. Not surprisingly, industry liked programs that increased economic benefits, competitive advantage, and flexibility. It might be worthwhile to examine in more depth the elements of some of the programs (33/50) that GEMI finds successful.

- **DOE's Industries of the Future program**. This program is a collaborative effort between industry and government to develop "technology roadmaps" to reach goals of energy-efficiency and "competitiveness" in seven industries. The industries are aluminum, chemicals, forest products, glass, metal casting, petroleum, and steel. Although the program is only a year old, DOE is now actively funding RFPs consistent with the roadmap. This new effort could serve as a basis to develop further voluntary actions with industry since it is already in place.

Attachments: Scorecard of CCAP emission reductions
One-page summary of 4 voluntary climate change programs
"Industrial Incentives for Environmental Improvement" GEMI report
Industries of the Future

Summary of Greenhouse Gas Emissions-Reduction Actions

Million Metric Tons of Carbon Equivalent

Source: U.S. Climate Action Report—1997

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
Residential & Commercial Sector Actions		**26.9**	**10.3**	--
New	Rebuild America	2.0	1.6	--
1 and 2	Expanded Green Lights and Energy Star Buildings	3.6	3.3	--
3	State Revolving Fund for Public Buildings	1.1	Terminated	
4 5	Cost-Shared Demonstrations of Emerging Technologies Operation and Maintenance Training for Commercial Building Facility Managers and Operators	3.8	0.0	--
6	Energy Star Products	5.0	4.3	--
7	Residential Appliance Standards	6.8	0.2	--
8 and 11 9 10	Energy Partnerships for Affordable Housing Cool Communities Update State Building Codes	4.4	0.4	--
New	Construction of Energy-Efficient Commercial and Industrial Buildings		0.1	--
New	Superwindow Collaborative		0.0	--
New	Expand Markets for Next-Generation Lighting Products		0.2	--
New	Fuel Cells Initiative		0.0	--
Industrial Sector Actions		**19.0**	**4.8**	--
12	Motor Challenge	8.8	1.8	--
13 14	Industrial Golden Carrot Programs Accelerate the Adoption of Energy-Efficient Process Technologies	2.9	Merged into Action 12 Terminated	
15	Industrial Assessment Centers	0.5	CCAP Component Terminated	
16	Waste Minimization	4.2	2.1	--
17 18	Improve Efficiency of Fertilizer Nitrogen Use Reduce the Use of Pesticides	2.7	0.8 Terminated	--
Transportation Sector Actions		**8.1**	**5.3**	--
19 20 21	Cash Value of Parking Innovative Transportation Strategies Telecommuting Program	6.6	4.6	--
22	Fuel Economy Labels for Tires	1.5	0.7	--
Energy Supply Actions		**10.8**	**1.3**	--
23	Increase Natural Gas Share of Energy Use Though Federal Regulatory Reform	2.2	Terminated	

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
24	Promote Seasonal Gas Use for Control of Nitrogen Oxides	2.8	0.5	--
25	High-Efficiency Gas Technologies	0.6	Terminated	
26	Renewable-Energy Commercialization	0.8	0.3	--
27	Expand Utility Integrated Resource Planning	1.4	Terminated	
28	Profitable Hydroelectric Efficiency Upgrades	2.0	0.0	--
29 30	Energy-Efficient Distribution Transformer Standards Energy Star Distribution Transformers	0.8	0.5	--
31	Transmission Pricing Reform	0.8	Terminated	
New	Green Power Network	Not included	0.0	--
Land-Use Change & Forestry Actions		**10.0**	**2.4**	--
43	Private Depletion of Nonindustrial Private Forests	4.0	Terminated	
44	Accelerate Tree Planting in Nonindustrial Private Forests	0.5	0.4	--
16	Waste Minimization	4.2	2.0	--
9	Expand Cool Communities	0.5	To be determined	
Methane Actions		**16.3**	**15.5**	--
32	Expand Natural Gas STAR	3.0	3.4	--
33	Increase Stringency of Landfill Rule	4.2	6.3	--
34	Landfill Methane Outreach Program	1.1	1.9	--
35	Coalbed Methane Outreach Program	2.2	2.6	--
36	RD&D for Coal Mine Methane	1.5	Terminated	
37	RD&D for Landfill Methane	1.0	Terminated	
38	AgSTAR Program	1.5	0.3	--
39	Ruminant Livestock Efficiency Program	1.8	1.0	--
Actions to Address Other Greenhouse Gases		**16.3**	**25.4**	--
17	Improved Fertilizer Management	4.5	5.3	--
40	Significant New Alternatives Program	5.0	6.4	--
41	HFC-23 Partnerships	5.0	5.0	--
42	Voluntary Aluminum Partnership	1.8	2.2	--
New	Environmental Stewardship Initiative	Not included	6.5	--
Foundation Actions			**11.3**	--
	Climate Wise	Not estimated	1.8	--
	Climate Challenge	Not estimated	7.6	--
	State and Local Outreach Programs	Not estimated	1.9	--
Total GHG Emission Reductions From CCAP		**108.6**	**76.0**	**14.0**

Data is not readily available for cumulative emissions reductions for many CCAP programs. Cumulative emissions reductions of about 5 MMTCE can be attributed to DOE's CCAP programs. EPA's Office of Air and Radiation is responsible for cumulative emissions reductions of about 9 MMTCE through their CCAP programs.

United States General Accounting Office

GAO

Report to Congressional Committees

June 1997

GLOBAL WARMING

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

GAO/RCED-97-163

GAO

United States
General Accounting Office
Washington, D.C. 20548

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

[1]The 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.)

[2]Greenhouse 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.

[3]According 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.

[4]EPA refers to it as WasteWi$e.

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

[5]According 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.

[6]This 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

[7]Although 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.

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

[9]Environmental 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.

[10]Such 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.

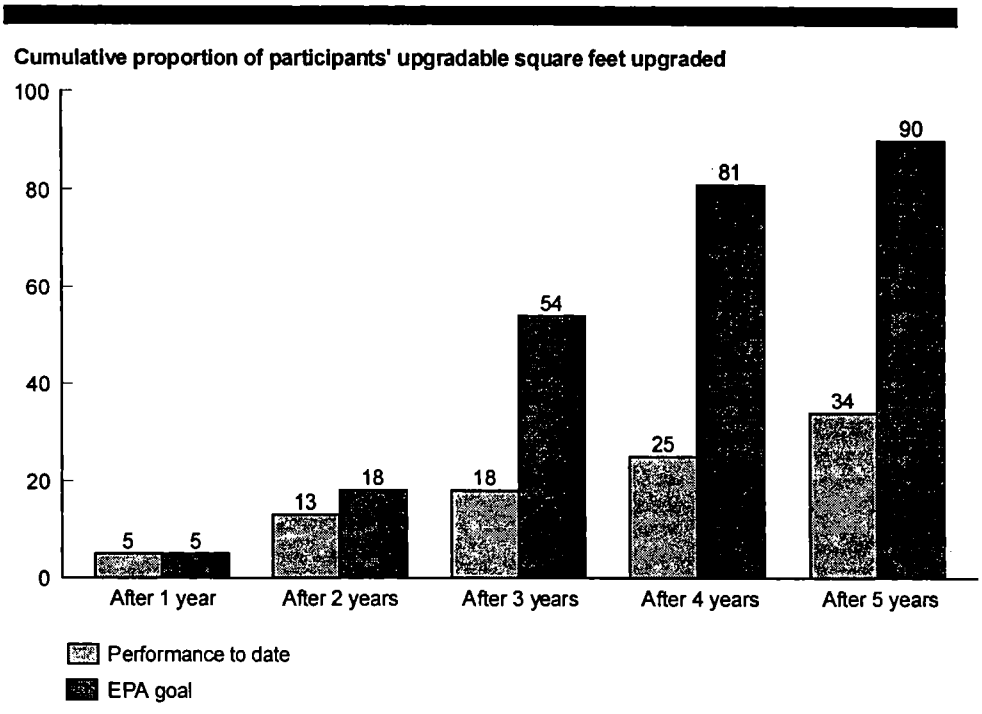
Green Lights Program

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)

[11]Gretchen 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

INDUSTRY INCENTIVES FOR

ENVIRONMENTAL IMPROVEMENT

Combined Executive Summary

for

Three Reports

Submitted to the

IDEA 21 Work Group of the

Global Environmental Management Initiative

(GEMI)

- *Industry Incentives for Environmental Improvement: Evaluation of U.S. Federal Initiatives*
  by Terry Davies and Jan Mazurek

- *Corporate Environmental, Health and Safety Practices in Transition: Management System Responses to Changing Public Expectations, Regulatory Requirements and Incentives*
  by Terry F. Yosie and Timothy D. Herbst

- *Incentives for Environmental Improvement: An Assessment of Selected Innovative Programs in the States and Europe*
  by Daniel P. Beardsley

The GEMI organization manages critical thinking about key environmental, health and safety issues. GEMI's Work Group, ***Incentives, Disincentives, Environmental Performance and Accountability for the 21st Century***, (***IDEA 21***), recently sponsored three independent research projects to better define and characterize incentives leading to improved environmental performance by business. GEMI supports and encourages full stakeholder review and consideration of these analyses. Without endorsing the analyses or advocating any particular set of actions, GEMI wants to provide the "spark" and energy that leads to discussions of environmental, health and safety issues.

GEMI commissioned these studies to provide the basis for further discussions with EH&S thought leaders. GEMI will make these studies available to other groups to use in developing models for the future. To this end, the *IDEA 21* Work Group has invited 20 or so top EH&S professionals to a two-day workshop later in October to discuss the results of the studies. In keeping with its non-profit status, GEMI will not engage in advocacy. However, the environmental community and other multi-stakeholder groups have asked for information and ideas from the business community about incentive-based programs. The studies and the workshop are designed to provide this information.

The three reports provide the following conclusions about future use of incentives:

- Key stakeholders need to agree on clear, specific, measurable environmental objectives.

- Given agreement on performance objectives, entities responsible for implementation should have the freedom to design plans that take advantage of pollution prevention, process modification, and other innovative alternatives to mandated end-of-pipe controls.

- Clear procedures should be established for open stakeholder participation in the design and implementation of programs. At the same time, these processes need to be linked to the achievement of program objectives.

- Incentives for participation in programs of this kind need to be *tangible and significant*. At a minimum, they should offer reduced transaction costs, such as less duplicative reporting requirements and quicker permitting. To be more attractive, programs should provide direct economic incentives to mitigate the future costs of pollution control.

GEMI's premise is that well-structured incentive programs can be very effective in advancing environmental objectives while improving pollution control efficiency for the private sector. GEMI also believes that incentive-based programs show tremendous promise for further advances in environmental performance and total quality environmental management in corporate programs. Results from the studies (which reached remarkably similar conclusions) do not prove that the current array of federal incentive programs support the GEMI premise. However, the studies do not dispute the GEMI *concept* that incentive approaches offer tremendous future promise. Most federal programs are relatively new, are still being refined; and need more systematic evaluation. The experience of state and European efforts to date is more positive. This information about cooperative and flexible incentive-based programs will provide important ideas and information to the many discussions about environmental regulation taking place outside of GEMI.

Combined Executive Summary

A. Introduction

In April, 1996, the Global Environmental Management Initiative (GEMI)* sponsored three independent, related studies. This document is a combined executive summary for all three, although this booklet contains only one of the three reports. The combined summary was produced because the three researchers found many common conclusions in their reports. It also alerts the reader to the other reports in the series. The three reports are:

- *Industry Incentives for Environmental Improvement: Evaluation of U.S. Federal Initiatives* by Terry Davies and Jan Mazurek
- *Corporate Environmental, Health and Safety Practices in Transition: Management System Responses to Changing Public Expectations, Regulatory Requirements and Incentives* by Terry F. Yosie and Timothy D. Herbst
- *Incentives for Environmental Improvement: An Assessment of Selected Innovative Programs in the States and Europe* by Daniel P. Beardsley

One report examined corporate attitudes about the environment, changes in environmental behavior, and corporate responses to incentive-based health and safety programs. Another report reviewed five major environmental and safety programs managed at the federal level of the United States (Project XL, the Common Sense Initiative, the sulphur dioxide emissions trading program, the OSHA STAR program, and the 33/50 Program). The final report assessed selected new environmental programs in Western Europe (the Netherlands, Sweden, and the United Kingdom) and programs managed by American states (Minnesota, New Jersey, Massachusetts, and Colorado).

GEMI had several purposes in funding this research:

- to identify incentives which seem most promising in terms of encouraging the private sector to get to the "next level" of environmental protection. To achieve this aim, incentives would have to be strong enough to influence corporate behavior and would have to lead to measurable environmental benefits.
- to determine the extent to which recent innovative programs launched by the federal government, the states, and European countries have demonstrated the utility of incentive-based programs; and
- to make available findings of this research to appropriate decision makers.

* GEMI is a not for profit organization of 21 leading corporations dedicated to helping business achieve environmental, health and safety excellence.

GEMI's premise is that well-structured incentive programs can be very effective in advancing environmental objectives and making pollution control more efficient for the private sector. GEMI also believes that incentive-based programs have tremendous promise for advancing continuous improvement and total quality environmental management in corporate programs. Results from the studies (which came to remarkably similar conclusions) do not prove that the current array of Federal incentive programs support the GEMI premise. Neither do the studies dispute the GEMI *concept* that incentive approaches offer tremendous future promise. Most Federal programs are relatively new, still being refined, and in need of more systematic evaluation. The experience of state and European efforts to date is more positive. This up to date information about cooperative and flexible incentive-based programs will inform the many discussions about environmental regulation taking place outside of GEMI.

The three studies were undertaken during a five-month period. This document summarizes the findings of those three studies. Relatively little quantitative data exists which documents either explicit economic or other benefits of voluntary programs to the private sector or environmental accomplishments--due in large part to the recent initiation of the environmental programs reviewed, though also to the limited public and private commitment to program evaluation. Researchers relied on data that was available as well as extensive literature reviews and interviews with program designers and participants.

B. Findings

This paper summarizes the findings of all three reports using the following format: 1) factors which appear crucial to voluntary program success or failure; 2) conclusions about the future use of incentives; and 3) other conclusions.

1. Factors in Program Success or Failure

Programs that either *are* working well (such as the Dutch covenants, Sweden's permitting program, and the New Jersey pollution prevention/facility-wide permit project) or *appear* to be successful thus far (Minnesota's programs, the Integrated Inspection Program and Printers' Project in Massachusetts, the Integrated Pollution Control program in the United Kingdom; at the federal level, at least to some extent: OSHA's Star Program and EPA's 33/50 and SO2 trading programs) share some common features. Successful programs have objectives that are relatively simple and clear both to government and business and enable participants to have a major voice in the establishment of goals. All these programs grant significant flexibility to business to engineer the means for implementing program objectives. In apparent recognition of the environmental sophistication of industry now, compared to 25 years ago, these programs mandate performance goals rather than technology. A third common element in successful programs is trust among the participants and stakeholders. Literally every interviewee in the European programs, the New Jersey program, and designers of the Minnesota programs noted the importance of the mutual respect and cooperative spirit shared by participants in program development; interviewees from these and other programs also saw important benefits in improved relationships with

regulatory agencies. The evidence is mixed as to whether these innovative programs are sacrificing strong enforcement, particularly in the case of federal initiatives.

Several other, more specific considerations should be noted about successful programs. To the extent "success" is defined in environmental terms, it should be measured. Evidence exists from both third-party evaluators and interviewees that New Jersey's program contains environmental benefits; indicative data is also noted to support the benefits of the United Kingdom and Dutch programs. From the industry perspective, these and related programs work because the incentives for industry to participate were clear and substantive: participants see economic benefits (reduced transaction costs), competitiveness advantages (faster time-to-market), and, in the case of 33/50, the flexibility to choose the means to achieve reductions. Finally, it is perhaps important that almost every successful state program was supported by state legislation.

Less successful programs also share common features. Some are the reverse of positive factors noted above: lack of clear, shared program objectives between government and business (and even between levels of government-- many states seem to believe that XL is about *alternative compliance* while EPA insists facilities must go *beyond compliance*); over-control by government in establishing program objectives, combined with pervasive mistrust among the participants; uncertainty about either business or environmental benefits of the program; and absence of a statutory base. This latter feature deserves particular attention.

The lack of a statutory basis for environmental initiatives or programs always foreshadows difficulty. Because of congressional, court, public interest, and other pressures, civil servants tend to spend their time--rightly--on programs grounded in law; other initiatives have lower priority. Also, without a legal mandate, decisions must be made by some sort of consensus, which is rarely efficient or effective in an atmosphere as contentious as environmental management. The lack of a statutory base can be ameliorated by clear objectives, maximum participation in developing those objectives to ensure buy-in and flexible implementation tailored to the self-interest of the participants. Absent these process commitments, non-statutory programs almost always fail.

Business participants note another major problem with the CSI and XL programs. The incentives for program involvement are weak to begin with, and risks of litigation and other failures are high. Against this backdrop, companies are increasingly discouraged by the unexpectedly high transaction costs of participation. Investment of staff time can be enormous. There is frustration over the length of the project review process and confusion over the role of stakeholders; facilities receive conflicting signals from different levels of EPA staff; and EHS staff are having difficulty convincing other corporate executives of the tangible benefits of the programs. Costs of participation, in other words, are beginning to outweigh incentives.

2. Conclusions About Future Use of Incentives

The following principles should guide the use of incentives in future voluntary programs:

- Key stakeholders need to agree on clear, specific, measurable environmental objectives.

- Given agreement on performance objectives, entities responsible for implementation should have the freedom to design plans that take advantage of pollution prevention, process modification, and other innovative alternatives to mandated end-of-pipe controls.

- Clear procedures should be established for open stakeholder participation in the design and implementation of programs. At the same time, these processes need to be linked to the achievement of program objectives.

- Incentives for participation in programs of this kind need to be *tangible and significant*. At a minimum, they should offer reduced transaction costs, such as less duplicative reporting requirements or quicker permitting. To be more attractive, programs will provide direct economic incentives which mitigate the future costs of pollution control.

For business, however, incentive-based programs must also be leveraged with other major drivers of corporate environmental performance. These include: performance-based management goals; cost-reduction objectives; industry sector characteristics; and reputation value.

3. Other Conclusions

Regarding the federal voluntary or incentive-based programs studied in this report, we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system. The sulphur dioxide emissions trading program--different in kind from the other four analyzed--may be an exception to this in mitigating costs for participating companies.

This is not to say that the *concepts* undergirding these programs are flawed. Companies welcome economic incentives and they are willing to exchange these benefits for greater commitments to environmental protection. Despite the cynical expectation, private sector support for incentive programs is not only economic: many of those interviewed believe that well-designed incentive programs are more beneficial for the environment. The problem for current federal programs seems to be in the need for better implementation: broader stakeholder participation in program design; clearer incentives and environmental protection objectives; a shared sense of purpose among federal, regional, and state government officials; and, probably, in the need for a statutory base.

The record of new state (and European) programs, though still uncertain given how recently these initiatives have been started, is more positive. States have been more effective in making facility managers feel involved in design and implementation. Trust and cooperation between government and the private sector is much higher in the state programs. Companies identify clear existing or potential benefits, mostly economic, but others as well. Where data exists, as in New Jersey and the United Kingdom, it suggests that measurable environmental benefits can be gained from properly structured incentive programs. The more successful programs are supported by legislation.

A likely shortcoming of the state programs, and the federal initiatives as well, is that both environmental and economic achievements will turn out to be marginal. As these experimental programs continue and are improved, consideration should be given to simply making them bolder--environmental objectives need to be made clearer and more measurable, and existing incentives for participation should be made more significant.

EXECUTIVE SUMMARY

This report evaluates new or existing business/government initiatives in the United States at the federal level. Primarily, we attempt to identify the elements of the program which would cause business to behave in a manner different from that required under a traditional command and control approach.

Five federal programs were selected for evaluation: the OSHA Star program and four EPA initiatives: the 33-50 program, Common Sense Initiative (CSI), Project XL, and SO_2 emissions trading. These programs represent the most prominent current efforts to motivate environmental improvement by business firms outside of the command-and-control framework.

The most important conclusion about the federal programs examined is that four of the five programs (SO_2 emissions trading is different in almost every way from the other four programs) are peripheral, both to business and society. They do not address most of the important problems with the pollution control system nor do they appear to contribute significantly to improving environmental quality or safety.

OSHA Star and the programs related to it have succeeded in establishing a positive image, but it is very debatable whether the programs have made any major contribution to occupational safety and health. XL and CSI may be too new to evaluate with any certainty, but there is no indication that either program will make a major contribution to environmental improvement or to lowering the cost of the pollution control system. 33/50 is quite different from XL and CSI in that the transactions costs of participating were close to zero. The minimal threshold for participation and the looseness of the criteria for success make it difficult to know how much impact 33/50 had.

In terms of their attractiveness to business, our review of the initiatives shows that there is no single incentive that appeals to all businesses. In fact, it is difficult to find a voluntary federal initiative that appeals to business at all. The emissions trading program is an exception, since it is required by law and participation clearly saves firms a significant amount of money. Our analysis of participation rates under the four voluntary federal programs studied show that the initiatives tend to attract very few businesses.

Of the four initiatives, 33/50 has attracted the most participants, followed by OSHA Star. Of the 8,000 manufacturers invited by EPA to join 33/50, about 14 percent signed on. There are about 98 companies with 231 work sites enrolled in OSHA's VPP program. Only ten facilities of extremely large U.S. market-leaders are implementing XL project plans. About 20 companies participate in CSI.

Table ES-1 shows that the different federal initiatives tend to feature different types of business incentives. Incentives depend in part on the goals of the program and types of firms that are targeted.

enviros, EPA, the states, Congress—often question the motives of the other elements and think that these other elements have a major advantage in whatever battles take place.

Environmental groups had misgivings about 33/50 because of the lack of any controls, and some groups argued for third-party audits to check on the results achieved by facilities. The program illustrates a fundamental conflict between the business community's desire for flexibility and simplicity and the environmental community's desire for certainty and enforceability.

Given the lack of consensus, if the badly broken pollution control system is to be mended it will have to be done through some problem-solving negotiating mechanism. It so happens that the Founding Fathers in their great wisdom provided just such a mechanism in the form of the U.S. legislative system. A basic conclusion to be drawn from our look at the administrative attempts at reform is that there is no short-cut, no way around the difficult task of trying to legislate a better system.

CHAPTER 1. OVERVIEW OF BUSINESS INCENTIVES

Theories of Incentives

Federal policy makers have several types of potential instruments at their disposal to promote corporate environmental excellence. Potential incentives include market-based strategies, such as emissions trading schemes, as well as voluntary programs that recognize and reward superior environmental performance.

While there is a rich literature that examines the relationship between business and laws designed to improve environmental health and safety, there are few theories and fewer quantitative studies which illustrate what incentives work best. Our literature search shows that most research on business incentives focuses not on the relationship between firms and federal regulators, but on how firms respond to other factors such as consumer demand, interest group pressure, and media attention.

In general, there exist three, distinct theoretical traditions on the role between business and federal health and environmental laws. These include what observers refer to as the "traditional" economic approach, the "revisionist" approach, and a more recent school of thought developed primarily by business, for business. The five initiatives examined below variously draw from these different groups of thought and research. Before discussing the performance of the five initiatives covered in this study, we will briefly review the three distinct sets of reports and findings that deal with incentives to industry.

The oldest and most data-rich of the three schools of thought on incentives comes from what is known as the "traditional approach."[1] Developed around 1960 -- roughly the same time as federal environmental laws and regulations were expanding -- the traditional environmental economic approach is premised on the idea that firms release pollution into the environment when pollution sources lack proper market signals. As the theory goes, laws that tell polluters how to reduce pollution tend to raise costs and lower productivity because firms, not government, know best how to control processes inside a plant.[2]

Environmental economists have conducted a number of studies on different industries which tend to reinforce the idea that command and control laws tend to raise manufacturing costs and lower productivity.[3] Based on theory and extensive research, traditionalists conclude that the

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[1] For a comprehensive review of this literature, see Jaffe, Adam B., Steven R. Peterson, Paul R. Portney and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 30. pp. 132-163.

[2] Cropper, Maureen L. and Wallace E. Oates. 1992. "Environmental Economics: A Survey," *Journal of Economic Literature*. Vol. 30. pp. 675-740.

[3] See, for example Barbera, Anthony J. and Virginia McConnell. 1990. "The Impact of Environmental Regulations on Industry Productivity: Direct and Indirect Effects." *Journal of Environ. Econ. Manage.*, Jan. 1990, 18(1), pp. 50-65. Gray, Wayne B. and Ronald J. Shadbegian, 1994. "Pollution Abatement Costs, Regulation, and Plant-Level Productivity." National Bureau of Economic Research, Cambridge, MA.

most effective and efficient way to improve environmental performance is to develop policies that harness market forces and let polluting firms decide how best to curb pollution.[4]

While the traditionalist school has endorsed the development of market-based incentives for several decades, most market-based initiatives are quite recent in origin. While they vary in scope and design, most market-based efforts encourage industries to trade emissions credits. Firms that are able to control pollution cost effectively sell credits to other companies that find control less cost effective. The sulfur dioxide allowance trading program, which targets utilities regulated under the Clean Air Act, is perhaps the most prominent of such initiatives and is examined in greater detail later in this report.

Recently, a small group of scholars has begun to revise the traditional economic approach in order to examine what effects environmental regulations have on the competitiveness of U.S. firms.[5] This "revisionist" group, associated with Harvard professor, Michael Porter, conclude that companies can use environmental requirements to gain market advantage over competitors. While intuitively appealing, the Porter hypothesis, for the most part, is yet to be supported with much empirical evidence. One recent review of the literature in this area concludes that both the purported positive and negative effects of environmental regulation on competitiveness were difficult to detect.[6] Despite the dearth of evidence to either support or refute Porter's hypothesis, some have nonetheless embraced his assertion that regulations can promote both economic growth and cleaner production.[7] The Common Sense Initiative (CSI), a recent EPA effort to promote "cleaner, cheaper" production through regulatory reform, is motivated, in part by revisionist assumptions. We examine CSI in greater detail below.

The third major strand of literature, perhaps most relevant to this study, is rooted more squarely in business traditions. Comprised of articles penned either by business leaders or industry consultants, the central premise of the business literature is that industry best understands what drivers are most appropriate.[8] In this regard, it is not inconsistent with traditionalist tenets. However, few business experts believe that firms operate according to the elegant theories advanced in college economics classes. There also are often strains of Porter's ideas in the

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[4] See, for example Barbera, Anthony J. and Virginia McConnell. 1990. "The Impact of Environmental Regulations on Industry Productivity: Direct and Indirect Effects." *Journal of Environ. Econ. Manage.*, Jan. 1990, 18(1), pp. 50-65. Gray, Wayne B. and Ronald J. Shadbegian, 1994. "Pollution Abatement Costs, Regulation, and Plant-Level Productivity." National Bureau of Economic Research, Cambridge, MA.

[5] Porter, Michael E. 1990. *The Competitive Advantage of Nations*. New York: Free Press. See also, "America's Green Strategy," 1991. *Scientific American*. Apr. p. 168.

[6] For a comprehensive review of this literature, see Jaffe, Adam B., Steven R. Peterson, Paul R. Portney and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 30. pp. 132-163.

[7] Jaffe, et. al. op. cit. p. 157.

[8] See, for example, "Corporate Environmentalism" 1992. *Columbia Journal of World Business*. Vol. 27. Nos. 3 and 4; Smart, Bruce. 1992. *Beyond Compliance: A New Industry View of the Environment*. Washington, D.C.: World Resources Institute; *The Greening of Environmental Business: Making Bottom-Line Sense of Environmental Responsibility*. Thomas F. P. Sullivan, ed. Rockville, MD: Government Institutes; *Changing Course: A Global Business Perspective on Development and the Environment*. 1992. Stephan Schmidheiny with the Business Council for Sustainable Development. Cambridge, MA: The MIT Press; Elkington, John and Tom Burke. 1987. *The Green Capitalists: Industry's Search for Environmental Excellence*. London: Victor Gollancz Ltd.

business literature as well: some environmental leaders say that good environmental practice is good for business.

According to the business literature, incentives to business should recognize and reward voluntary business efforts to deliver environmental performance superior to requirements set out under existing laws and regulations. The U.S. Environmental Protection Agency's 33/50 program and the Star program advanced by the Occupational Safety and Health Administration (OSHA), follow these tenets and are examined in greater detail below.

While it most closely reflects real-world business practices, the business literature is the least theoretical of the three. The business findings also are supported by the least quantitative data. Most accounts of what drive industry to deliver superior results are anecdotal and derived either from roundtable discussions, expert panels, or non-scientific surveys. One reason so little quantitative data exists to support these assertions may stem from the fact that it is not in a firm's interest to release data that potentially may fall into the hands of competitors or generate adverse publicity. Often firms do not collect data that would be relevant to assessing incentives or collect it in a way that makes comparisons impossible.

There is evidence that some scholars are starting to fill the business data void. One example is a recent study in the business literature that attempts to identify what determines how companies respond to public expectations on natural environmental issues.[9] While the focus of the research differs slightly from the question of what incentives the federal government can use to better target business, the results nonetheless appear to support influential, qualitative studies in the business literature.

Researchers surveyed medium-sized U.S. steel and semiconductor manufacturing facilities and then subjected the results to expert review. To secure the data, participating firms were promised anonymity. Overall, the researchers found that the "legitimacy" of environmental concerns is the most important incentive for firms that have proactive environmental strategies. In other words, managers must perceive societal expectations concerning the environment as justifiable. Cooperation and trust with regulatory agencies were other factors that distinguished proactive firms. The study also found that, in almost all cases, corporate environmental leaders are led by a top executive who is clearly committed to environmental issues. While the study does not make policy recommendations, the findings suggest that initiatives which build trust between companies and federal regulators may appeal to some businesses.

The recent business findings are consistent with other research that contrasts the U.S. environmental system with that of other industrialized countries.[10] The research based on international comparisons suggests that the U.S. system of laws and administrative procedure tends to place industry and regulators at odds.

Due in part to the inherently litigious and time-consuming nature of the present system reflected in the writings on business, some conclude that reform is simply not possible under the

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[9] Judge, William Q. Alex Miller and Dorn Fowler. 1996. "What Causes Corporate Environmental Responsiveness." *Corporate Environmental Strategy*. Vol. 3. No. 3. pp. 42-48.

[10] Wallace, David. 1996. *Environmental Policy and Industrial Innovation: Strategies in Europe, the U.S. and Japan*. The Royal Institute of International Affairs. London: Earthscan Publications Ltd.

2. 33/50 PROGRAM

Program Description

EPA's 33/50 Program is a voluntary pollution prevention initiative that began in the late 1980s. The Program was an outgrowth of several events. In 1989, EPA formed its first voluntary pollution reduction agreement with nine "ATERIS" (Air Toxics Emissions Reductions Inventory System) companies to reduce 83 percent of their toxic air emissions by 1993.[1] This agreement was made between then-Administrator William K. Reilly and the ATERIS chief executive officers in an experiment to test the potential for using voluntary agreements to pollution control.

The following year, the Science Advisory Board's report, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* emphasized the threat of toxic chemicals and stressed the need for source reduction as the preferred method to reduce public risk, directing EPA's attention towards reducing toxics.[2] During the same month, the Pollution Prevention Act of 1990 was passed. It emphasized reducing the quantity of hazardous substances, pollutants, or contaminants from entering a waste stream or being released into the environment prior to recycling, treatment, or disposal. The legislation focused on methods for reducing waste at its source and otherwise preventing the creation of pollution, rather than on controlling or treating emissions.

In response to the increased focus on pollution reduction, EPA launched the 33/50 Program which sought voluntary cooperation from industrial firms to significantly cut toxic chemicals in releases and transfers primarily through source reduction. The Program used EPA's Toxic Release Inventory (TRI) to monitor participating firm releases and the program's progress. The TRI is the accumulation of facility-reported information describing their releases to air, water, and land of some 450 chemicals.[3] Although the TRI covers only a small number of facilities and pollutants, it is nevertheless the most comprehensive collection of firm-specific pollution emissions data available. The Program's baseline year for comparison was 1988.

The Program monitored the emissions of 17 toxic chemicals which are listed Table 2-1. The chemicals were selected primarily because of their threat to the environment and public health, potential for high exposure, volume of production and release, and potential for pollution reduction and prevention. These chemicals represented the most widely released and most toxic chemicals in the TRI. During 1988, 1.49 billion pounds of the 17 target chemicals were either released to the environment on-site or transferred off-site to waste management facilities.[4] Combined, they comprised about one-fourth of the total TRI releases and transfers in 1988.

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[1] INFORM. *Toxics Watch 1995*, INFORM: New York (1995).

[2] Environmental Protection Agency. *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, report of the Science Advisory Board: Relative Risk Reduction Strategies Committee to William K. Really, (9/90, SAB-EC-90-021)

[3] EPA has expanded the list each year since 1987. In 1988, the baseline year for 33/50, the TRI accounted for the releases and transfers of about 320 toxic chemicals.

[4] Environmental Protection Agency. *1994 Toxic Release Inventory, Public Data Release*, Office of Pollution Prevention and Toxics (June 1996 EPA/745-R-002).

Table 2-1: 33/50 Program Chemicals[5]

1. Benzene 2. Cadmium and cadmium compounds 3. Carbon tetrachloride 4. Chloroform 5. Chromium and chromium compounds 6. Cyanide compounds 7. Dichloromethane 8. Lead and lead compounds 9. Methyl ethyl ketone	10. Mercury and mercury compounds 11. Methyl isobutyl ketone 12. Nickel and nickel compounds 13. Tetrachoroethylene 14. Toluene 15. 1,1,1-Trichloroethane 16. Trichloroethylene 17. Xylenes

A secondary reason that EPA selected these chemicals was that they represent mostly airborne releases and are regulated by the Clean Air Act Amendments (CAAA). Companies that chose to participate in the 33/50 program would be eligible for the Early Emissions Reduction provision of the CAAA.[6] The provision gives firms additional time to comply with applicable emissions standards if they significantly reduce their emissions before the standards are proposed.

EPA formally announced the 33/50 Program in February 1991. The Program had 3 goals, as seen in Table 2-2. The first goal was a 33 percent reduction (491 million pounds) in releases and transfers of 17 toxic chemicals by 1992. The Program's second aim was a 50 percent reduction (744 million pounds) of releases by 1995. Finally, the Program sought to demonstrate that voluntary reduction programs could achieve targeted reductions faster than could be done by EPA's traditional regulatory approach alone.[7] The 33/50 Program's name derives from its first two goals.

Table 2-2: Goals of the 33/50 Program[8]

Goal Type	Operationalized Goal
• Interim reduction goal	• Reduce 17 TRI pollutants by 33 percent (491 million pounds) by 1992.
• Ultimate reduction goal	• Reduce 17 TRI pollutants by 50 percent (744 million pounds) by 1995.
• General goal	• Show that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods.

[5] Ibid.
[6] General Accounting Office [a]. *Toxic Substances: EPA Needs More Reliable Source Reduction Data and Progress Measures*, (Chapter Report, 09/23/94, GAO/RCED-94-93).
[7] EPA (1996).
[8] Ibid.

Companies that reported using or releasing one or more of the 17 target chemicals were encouraged by EPA to join the 33/50 Program. EPA solicited potential participants by extending invitations to three specific groups of firms, as seen in Table 2-3. The first group was invited in February 1991. This group represented the "Top 600" emitters of 33/50 Program chemicals. These firms were characterized by larger operations and accounted for more than 75 percent of the total 1988 releases and transfers of the 17 target chemicals. More than 60 percent of the "Top 600" companies chose to participate. The second group received invitations to participate in July 1991. This group represented the 5,000 remaining companies that emitted 33/50 chemicals in 1988 (all firms not on the "Top 600" list). The final group was invited to join in July 1992. This group was comprised of 2,500 firms that did not report 33/50 chemical releases in 1988, but did so in subsequent years. The second and third groups were characterized primarily by smaller operations and were less responsive to EPA's solicitation for Program enrollment; about 13 percent of these companies participated.

Table 2-3: Characteristics of Invited and Actual 33/50 Program Participants[9,10]

Group	Firms	Number of Invitations	Invitation Date	Participation Rate
1st invited group	"Top 600" firms	600	February 1991	60%
2nd invited group	TRI reporting firms not on "Top 600" List	5,000	July 1991	15%
3rd invited group	Firms with no 33/50 chemical releases in 1988 but emitted some in later years	2,500	July 1992	12%
Actual 33/50 Participants	*Firms that emitted 63% of all 33/50 chemical releases in 1988*	*8,100*	-	*16%* *1,300 firms*

The Program targeted parent companies, rather than individual facilities. By receiving pledges from the parent company, EPA sought participation from every facility within the company. Of the 8,000 companies contacted, 1,300 parent companies pledged participation. Releases and transfers reported by these companies represented 63 percent of all 1988 releases and transfers of 33/50 Program chemicals and 15 percent of all TRI emissions.[11] Participants pledged to voluntarily reduce 385 million pounds of pollution.

The Program was designed to recognize a company's participation when it submitted to EPA in writing its intention to participate and pledged a corporate-wide numerical reduction

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[9] Ibid.

[10] Arora, S. and Cason, T. "Why Do Firms Overcompiy with Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Discussion Paper 95-38*, Washington DC: Resources for the Future (1995).

[11] Ibid.

commitment for any of the 17 target chemicals through 1995.[12] There were no requirements on the reduction commitments and companies obligated themselves to whatever reductions were appropriate for their firm. Some companies focused their goals on all 33/50 chemicals, while others focused on a specific few, while still others promised to reduce all TRI releases, extending beyond the Program's 17 chemical emphasis.

Participants in the 33/50 Program received support from EPA in several forms. EPA organized regional pollution prevention workshops and conferences. The conferences brought together representatives from industry, government, academia, and public interest groups. They sought to foster an exchange of information on the varying perspectives of pollution prevention. The conferences also promoted collaborative action and partnerships among the conference participants. Further, they showcased companies that were successful at achieving pollution reductions and publicized them in EPA's media relations, documents, and newsletters.

Other support came in the form of technical assistance to 33/50 Program participants. Information was disseminated on emerging pollution prevention technologies for TRI chemicals. In addition, the Agency provided industry-specific guidance, reference manuals, bibliographic reports, and videos covering topics from generic pollution prevention to detailed instructions on setting up waste reduction programs for specific industries, processes, or materials. Finally, the Program also referred companies to training courses offered by states and private sources.

The 33/50 Program continued to accept new companies throughout its tenure, although efforts to actively solicit participation ended in 1994. While the Program's national goals were targeted for achievement by the end of 1995, companies have been encouraged to continue their reductions.

Summary of Program Effectiveness

TRI data have a two-year lag on public release, that is, chemical release data for 1995 are not available until 1997. The lag is due in part to a delay in both company reporting and EPA's compilation of aggregate industry releases. As such, the effectiveness of the 33/50 Program through 1995 cannot be determined until the second half of 1997. For now, the Program can be evaluated through 1994.

The 33/50 Program can be divided into two evaluation areas: fulfillment of the Program's goals (see Table 2-2) and agreement with the goals of the Pollution Prevention Act (PPA).[13] Both areas are evaluated below.

EPA reports that all three of the 33/50 Program's goals have been fulfilled. The Program's interim goal of a 33 percent reduction in the 17 target chemicals was achieved one year

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[12] EPA did not deny participation to any individual facility that wanted to participate, regardless of whether the parent company pledged its participation. This was criticized later by INFORM and GAO because the parent company received credit for participation even if only one of its facilities participated. Also, companies were recognized as Program participants regardless of whether a numerical reduction goal was specified.

[13] Besides these two areas, EPA also evaluates emission projections through 1995. Our analysis omits company reduction projections due to the speculative nature of the estimations.

ahead of schedule and exceeded by over 100 million pounds, as seen in Table 2-4.[14] The Program's ultimate goal of a 50 percent reduction in target chemicals was also achieved a year early. Altogether, the releases and transfers of 33/50 Program chemicals were reduced by 51 percent (757 million pounds) between 1988 and 1994. These reductions represent nearly twice the 385 million pounds initially pledged by participating companies.[15]

Table 2-4: EPA's Evaluation of the 33/50 Program's Goals[16]

Goal Name	Operationalized Goal	Outcome
• Interim reduction goal	• Reduce 17 TRI pollutants by 33 percent (491 million pounds) by 1992.	• Achieved in 1991, one year ahead of the 1992 target date • 590 million pound reduction • 40% reduction of Program chemicals
• Ultimate reduction goal	• Reduce 17 TRI pollutants by 50 percent (744 million pounds) by 1995.	• Achieved in 1994, one year ahead of the 1995 target date • 757 million pound reduction • 51% reduction of Program Chemicals • Reductions represent twice the amount pledged by participating firms
• General goal	• Show that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods.	• 33/50 firms reduced their chemicals at faster rates than non-participating firms • 33/50 chemical reductions were at faster rates than other TRI chemical reductions

EPA reports that the 757 million pound reduction is the minimum amount that Program participants attempted. About one-third of participating parent companies made pledges that extended beyond the Program's scope. For example, some Program participants pledged to continue their reductions after 1995. Other participants claimed a reduction for chemicals beyond the 17 target chemicals. Several multinational corporations, which were not targeted by EPA as potential participants, also pledged their reductions. Others went beyond targeting end-of-pipe releases or transfers by attempting to reduce their actual use of toxic chemicals.[17]

While the 33/50 Program was initiated in 1991, EPA uses 1988 as the baseline year to evaluate the Program's goals. TRI reporting facilities, however, began reducing their emissions of 33/50 chemicals prior to the Program's start; about 83 percent of all facilities began reducing 33/50 chemicals emissions between 1988 and 1991.[18] For this reason, the General Accounting Office (GAO) has criticized EPA for using the 1988 baseline when analyzing the Program's

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[14] EPA (1996).
[15] Ibid.
[16] Ibid.
[17] Companies that focused on chemical reduction did not stipulate the impact such pollution prevention initiatives had on environmental releases of 33/50 Program chemicals.
[18] Citizen Fund. *Pollution Prevention or Public Relations?* Washington, DC: May 1994.

effect.[19,20] GAO argues that only reductions between 1991 and 1994 should be considered when evaluating the Program's progress.

As seen in Table 2-5, the Program's results change substantially when evaluating its first two goals subsequent to 1991. Between 1991 and 1994, 33/50 chemicals have fallen by 204 million tons, representing a 27 percent decrease in target chemicals, as compared to the 51 percent reduction using the 1988 baseline.

Table 2-5: Comparison of Baseline Years and Participant Reductions to Program's Reduction Goals

Goal Name	Reduction Goals and Year	Total Reductions 1988 to 1994	Total Reductions 1991 to 1994
• Interim reduction goal	1992: 33%	40%	12%[21]
• Ultimate reduction goal	1995: 50%	51%	27%

EPA calculates the 33/50 chemical reductions by aggregating all firm reductions. The Agency does not distinguish between reductions that were made by Program participants and non-participants. Thus, reductions that were made by non-participants count towards the Program's goals. GAO estimates that 38 percent of targeted reductions are attributable non-participating companies.[22]

EPA responded to GAO's criticisms by seeking an independent research firm to determine the Program's value. INFORM, a nonprofit environmental research organization, was selected to do the analysis. INFORM's analysis controlled for emissions reductions attributable to non-participating companies.[23] Its findings confirmed GAO's concerns about the Program's weak evaluation measures. INFORM showed that 31 percent of the participants had already initiated reduction activities prior to the announcement of the 33/50 Program.[24,25]

EPA's evaluation of the third goal (the Program's general goal) attempts to separate the contributions participants and non-participants to better capture the Program's affect. The third goal was to demonstrate that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods. EPA shows that between 1991 and 1994, Program participants reduced their releases and transfers of target chemicals by 49 percent, whereas, non-

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[19] GAO[a].

[20] General Accounting Office [b]. *Toxic Substances: Status of EPA's Efforts to Reduce Toxic Releases*, (Chapter Report, 09/22/94, GAO/RCED-94-207).

[21] Reductions between 1991 and 1992.

[22] This estimate is 16 percent higher than EPA's approximation. EPA has recognized that a considerable portion of the reductions reported by the Program were achieved by firms not formally participating in the Program, but the Agency believes the Program's presence influenced some of these firms to reduce toxic releases.

[23] INFORM (1995).

[24] Ibid.

[25] EPA (1996) acknowledges that some of the Program's reductions did result from non-participants. The Agency estimates that about 26 percent of the reductions (196 million pounds) between 1988 and 1991 and 30 percent (82 million pounds) between 1991 and 1994 can be attributed to non-participating firms.

participating companies reduced their emissions of 33/50 chemicals by 30 percent, as seen in Table 2-6.[26] Thus there is a 19 percent reduction difference that may be due to the Program's affect. The reduction difference is also seen when comparing 33/50 chemical releases and transfers to other TRI chemical emissions. Between 1991 and 1994, 33/50 chemical releases and transfesr fell by 42 percent as compared to all other TRI chemical releases which have fallen by 22 percent. Thus Program participants achieved greater reduction quantities in less time than did non-participants.

Table 2-6: EPA's Comparison of 33/50 Program Participants to Non-Participants and 33/50 Chemicals to Other TRI Chemicals[27]

Issue	Years	33/50 Program Participants	Non-participants
• Releases and transfers of Program chemicals	1991 to 1994	-49%	-30%
• Percent of total 33/50 chemical reduction	1991 to 1994	70% of total	30% of total

Issue	Years	33/50 Program Chemicals	Other TRI Chemicals
• Releases and transfers of Program chemicals for treatment and disposal	1988 to 1991 1991 to 1994	-16% -42%	-20% -22%
• 33/50 chemicals in production-related waste	1991 to 1994	- 1%	9%

The PPA focuses on reducing waste at its source, thereby preventing pollution rather than controlling or treating it. When EPA launched the 33/50 Program it emphasized reducing toxic chemicals through source reduction. The extent to which the 33/50 Program has fulfilled the PPA's goals is the second area to evaluate the 33/50 Program's success. The best indicator for a firm's source reduction activity is its variation in production-related waste. A company's production-related waste is determined by aggregating all its recycled, reused, combusted, treated, and released emissions both on- and off-site. It includes all waste management practices other than pollution prevention. When production-related waste falls, source reduction is likely to increase. The 33/50 Program did not require participating firms to reduce their chemical emissions through source reduction. This may be one reason for the marginal changes in production-related waste. Between 1991 and 1994, participating firms have reduced their production-related waste by 1 percent, as seen above in Table 2-6. Non-participating firms, however, have *increased* their production-related waste by 9 percent. So, while source reduction activity is low for 33/50 firms, it still outpaces the activity by non-participants.

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[26] EPA (1996).
[27] Ibid.

Citizen Fund, GAO, and INFORM have all criticized EPA for not following the PPA's emphasis on source reduction.[28] All three organizations argue that the Program's emphasis on source reduction should have been an integral part of its goals and a requisite for participation. Because source reduction was not required, it was not the preferred waste management method. Most companies relied primarily on end-of-pipe treatment technologies or on-site recycling and energy recovery, rather than source reduction, to reduce their releases and transfers of the 17 Program chemicals.[29]

The 33/50 Program's 5-year existence is too short to draw any causal relationships between the Program and emissions changes; only associations can be shown. As such, the reader should regard the results presented above with caution; they are only trends.

Relevance for Industry Incentives

EPA designed the 33/50 Program so that companies would participate for a variety of reasons. The Agency hoped that firms would participate to take advantage of the early emissions reduction provisions in the CAAA. EPA also believed that companies would view participation as an opportunity to gain public recognition for their commitment to pollution management. Finally, the Program was designed to give participants great flexibility in reducing emissions and required few prerequisites to join the Program, thereby minimizing the administrative burden and allowing firms to decide their most cost-effective method of pollution control.

The incentive to participate in order to qualify for credit under the early emissions reduction provision of the CAAA has not been significant, as participation in the Early Reductions Program is limited. In 1994, EPA had only 40 active applications from facilities and had approved 12 for the 6-year extension. The low applicant response may be due to several reasons. First, it is not certain whether 33/50 participating companies knew of the early reduction incentives when they pledged their participation to EPA. The small number of active applications may reflect a limited number of companies having knowledge of its existence rather than lack of interest. A second, reason for the low applicant response may be due the program's extensive qualification requirements.[30] To qualify, facilities must establish base-year emission levels and demonstrate a 90 to 95 percent reduction from those levels. The compilation of base-year data is a difficult process, requiring a significant investment of time and personnel. Consequently, some facilities withdrew their applications to participate in the program once they realized the amount of resources needed to fulfill the program's requirements.[31]

Large firms were more likely to participate in the 33/50 Program. About 60 percent of all participating firms were characterized as being large companies with high quantities of both 33/50 and total TRI chemical emissions. These companies were more likely to have the resources available to invest in pollution reduction activities. Many of these companies began their reduction activities immediately after the announcement of the 1988 TRI data and for the two years prior to the initiation of 33/50. By participating in the 33/50 Program, these companies

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[28] Citizen Fund (1994), GAO [a][b](1994), and INFORM (1995).
[29] INFORM (1996).
[30] GAO[b] (1994).
[31] Ibid.

were able to capitalize on the reductions that they had already made, showcase their concern for the environment, and receive publicity through EPA and their own marketing strategies. For firms that were concerned about their environmental image after TRI data were first made public, the 33/50 Program may have been a vehicle to show their support for corporate environmental management.

Finally, program participant's pollution management focused mainly on emissions control and recycling techniques rather than source reduction. As noted earlier, EPA did not require source reduction activities as a requisite for participation. Yet even without the explicit emphasis on source reduction, firms participating in the 33/50 Program had a greater incentive to reduce waste at the source. While production-related waste has increased, it has been at a smaller rate than waste production for non-participating firms. The Program gave flexibility to its participants and encouraged innovative approaches to pollution control rather than requiring prescriptive standards for waste treatment and disposal. Thus companies could determine their most cost-effective means to reduce emissions which often includes reducing waste at the source. Also, the Program offered industry-specific technical assistance and information on emerging pollution prevention technologies, thereby increasing the likelihood of source reduction.

Arora and Cason (1995) researched the statistical probability of a firm participating during the first two years of the Program.[32] Their analyses show that firms characterized by high customer interfacing were 20 percent more likely to participate in the 33/50 Program, as seen in Table 2-7. The authors speculate that one reason for the increased firm participation is due to a greater proximity to the final customer. EPA marketed the Program as a means for firms to gain public recognition for their responsible environmental management. Those firms whose operations were closer to their final customer were more likely to be able to capitalize on the increased public recognition and participate in the Program.

Table 2-7: Characteristics of Firms Likely to Participate in the 33/50 Program[33]

Firm Description	Increased Probability of Participation
High customer interfacing	20 percent
High R&D intensity	12 percent
Large number of employees	44 percent
High non-33/50 chemical releases	99 percent
High 33/50 chemical releases	22 percent

Arora and Cason also show that firms with larger investments in research and development (R&D) were more likely to participate in the Program. The authors argue that this was because firms engaged in substantial R&D had the capability to devote resources towards

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[32] Arora, S. and Cason, T. "Why Do Firms Overcomply with Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Discussion Paper 95-38*, Washington DC: Resources for the Future (1995).
[33] Ibid.

pollution management. R&D increased the likelihood of participation by 44 percent. In addition, the results also show that larger firms had an increased the likelihood for Program participation. This relationship is partially verified by EPA's report of a 60 percent participation rate from larger firms at the Program's close.[34] The authors speculate that larger firms have greater access to resources that could be dedicated towards pollution reduction and Thus they are more likely to participate. Finally, a firm's quantity of chemical emissions, both 33/50 and non-33/50 showed a significant relationship with its likelihood for Program participation even after firm size was controlled. Thus firms with higher chemical releases were more likely to participate in the 33/50 Program.

In closing, while the 33/50 Program appears to have met its goals other factors besides participant reductions have contributed to its success. Reductions made by non-participating firms and reductions made prior to the Program's start have diluted the Program's effect. When controlling for these variables, though, the Program may have resulted in an additional 19 percent reduction in 33/50 chemicals.[35] The Program's flexibility, technical assistance, and publicity may have encouraged these enhanced reductions, although the data that to support the assertion are limited. What is known about firm participation is that larger firms with greater chemical releases were more likely to participate. Also, firms with larger investments in R&D and greater customer interfacing had a greater probability of participating in the Program.

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[34] EPA also reports projections through 1996 which are omitted due to the speculative nature of the estimations; Environmental Protection Agency. *EPA's 33/50 Program Sixth Progress Update, Continuing Progress Toward Ultimate Reduction Goal*, Office of Pollution Prevention and Toxics (9/95 EPA 745-K-95-001).

[35] EPA shows that between 1991 and 1994, Program participants reduced their releases and transfers of target chemicals by 49 percent, whereas, non-participating companies reduced their emissions of 33/50 chemicals by 30 percent, as seen in Table 2-6. Thus there is a 19 percent reduction difference that may be due to the Program's affect.

5. OSHA's VOLUNTARY PROTECTION PROGRAMS

Introduction

The Occupational Safety and Health Administration's (OSHA) Voluntary Protection Programs (VPP), adopted on July 2, 1982, are voluntary, cooperative agreements among labor, management, and the federal government. The VPP's purpose is to recognize and promote excellence in employer-provided occupational safety and health management. The primary goal of participation in OSHA's VPP is reduced workplace injuries and illnesses. Other intended benefits of the program include employer financial savings, improved employee morale, enhanced ties with the regulator and employees, and increased production, presumably the fruit of improved employee morale and fewer lost employee workdays.

There are three VPP programs: Star, Merit, and Demonstration. The Star program is the most demanding program of the three. OSHA's Star program requirements are based on the most comprehensive safety and health programs used by American industry. The program aims to recognize leaders in injury and illness prevention programs who have been successful in reducing workplace hazards and to encourage others to such success. In order to be eligible for the program, a general industry applicant (non-construction applicant) must have an average of both lost workday injury case (LWDI)[1] rates and injury/illness incident (II)[2] rates for the most recent three year period at or below the most recent specific industry average published by the Bureau of Labor Statistics (BLS). Requirements for an application from a firm in the construction business are slightly different. The LWDI rates and II rates must be at or below the national average for that type of construction. Star participants are expected to demonstrate continuous improvements in LWDI rates and II rates during their triennial evaluations.

A site's[3] safety and health program must satisfactorily address the following areas in order to qualify for the Star program: management commitment and planning, hazard assessment, hazard construction and control, safety and health training, employee participation, and safety and health program evaluation. By addressing these areas, employers have the opportunity to go beyond standards set by OSHA to provide the best possible safety and health protection at a site. Employers who are approved for VPP participation are removed from routine inspection lists. This frees OSHA's inspection resources for visits to establishments that are less likely to meet the requirements of the OSHA standards. If problems do arise, OSHA and VPP participants address them cooperatively. VPP does not diminish in any way employer/employee rights or responsibilities under the Occupational Safety and Health Act of 1970.

The Merit program is aimed at employers in any industry who do not yet meet qualifications for the Star program but who wish to work toward Star program participation. An applicant will be admitted to the Merit program if OSHA determines it has demonstrated the commitment and potential to achieve Star status. The Merit program is open to sites with injury

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[1] Lost workday injury/illness (LWDI) rate refers to the number of lost workdays through occupational injury or illness per 100 employees.

[2] Injury/Illness incident (II) rate refers to the number of occupational injuries/illnesses per 100 employees.

[3] A site may be defined as the geographical location of a facility or set of facilities. A facility may be defined as one or more buildings at a site associated with the same activity or function.

rates worse than the industry's national average. The Merit program is used to set goals, that when achieved, will qualify the site for Star participation. A site will be approved for Merit status if it is expected to reach Star status.

The Demonstration program provides the opportunity for companies to demonstrate the effectiveness of alternative methods which, if proven successful, could be substituted as alternative qualifications for the Star program in certain situations. It is also an opportunity to experiment with safety and health programs in industries, such as maritime and agriculture, not traditionally associated with such programs. It also provides a vehicle to test ways to overcome problems that may have discouraged small businesses from participating in the VPP.

As of May 1, 1996, there were 231 participating worksites in the VPP -- 191 in Star, 37 in Merit, and 2 in Demonstration.[4] 98 different companies are enrolled in VPP.[5] There are more worksites than companies participating in the VPP because many companies are represented by more than one worksite. International Paper has the highest number of participating sites, 17.[6] Occidental Chemical and Mobil Chemical are second and third with 12 and 10 participating sites respectively.

Participating worksites involve more than 203,850 workers. This is less than one-half of 1% of the workers in the mining, construction, manufacturing, transportation and utilities, wholesale trade, and hospital industries.[7] This is approximately 1% of the workers in just the manufacturing industry. 207 of the 231 (87%) participating worksites are from manufacturing.[8] 73 (32%) of the participating worksites are from the chemical manufacturing industry.[9] Only 3 of the 98 participating companies fit the traditional definition of a small business -- no more than 500 employees in a company. The primary reason for lack of small business representation is that most small businesses simply do not have the resources necessary for participation.

The Occupational Health and Safety Act of 1970 (29 USC 651) provides the statutory framework for OSHA's VPP. It was enacted "to ensure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." Section 2(b) of this act specifies the means Congress intended OSHA to use to implement these goals:

> (1) by encouraging employers and employees in their efforts to reduce the number of occupational and safety health hazards at their places of employment, and to stimulate employers and employees to institute new and to perfect existing programs for providing safer and healthful working conditions."
>
> (4) "by building upon advances already made through employer and employee initiatives for providing safe and healthful working conditions."
>
> (5) "by developing innovative methods, techniques, and approaches for dealing with occupational and safety health problems."

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[4] Occupational Health and Safety Administration. *Voluntary Protection Program Facts*, May 1, 1996, p.1.
[5] Ibid.
[6] However, this is just over 4% of the 400 or so Weyerhaeuser sites eligible for entry into the VPP program.
[7] This figure is based on 1994 employment data, provided by the *1995 Statistical Abstract of the United States* published by the US Department of Commerce, for the aforementioned industries, the types of industries participating in OSHA's VPP.
[8] These figures are calculated from OSHA's 1995 VPP data base.
[9] Ibid.

(13) "by encouraging joint labor-management efforts to reduce efforts to reduce injuries and disease arising from employment."

A commonly asked question about VPP is: aren't OSHA's standards sufficient to accomplishing all the goals established by the act? OSHA believes compliance with its standards alone is not sufficient to accomplish the goals established by the act. Standards, no matter how carefully conceived and properly developed, will never cover all unsafe activities and conditions. In addition, limited resources will never permit regular or exhaustive inspections of all the nation's workplaces. It is employers and employees with their daily experience in the workplace that have an intimate knowledge of all the processes, materials, and hazards associated with a particular industry. This knowledge, combined with the ability to evaluate unique hazards quickly, allows employers and employees to improve workplace safety in ways simply not available to OSHA.

How effective has the VPP been?

Evaluating the effectiveness of OSHA's VPP programs is difficult. OSHA states that the purpose of the VPP is to emphasize the importance of, encourage the improvement of, and recognize excellence in employer-provided site-specific occupational safety and health programs. OSHA's VPP certainly does these things. However, the ultimate question of whether OSHA's VPP brings about significant improvements in the safety and health records of our nation's worksites is more difficult to determine.

One reason for the difficulty in assessing the effectiveness of OSHA's VPP is the paucity of data on the safety performance of companies before and after they entered the VPP. Both OSHA and the Voluntary Protection Programs Participants' Association (VPPPA), a private non-profit group of VPP members that helps OSHA publicize and support voluntary protection, have some data on the performance of companies after they entered VPP, but they possess very little data about a company's performance before entering the program. As a result, it is almost impossible to ascertain whether the significant improvements in LWDI rates and II rates that OSHA and VPPPA present were actually due to participation in the program, were simply the continuation of a trend, or were greater when a participating company was outside the program.

For instance, the Thrall Car Manufacturing Company in Winder, Georgia decreased its LWDI rate from 17.9 in 1989 when the facility began implementing a VPP quality safety and health program to 4.6 in 1992 when the plant was ready to qualify for the Star program.[10] No data is given to indicate what the LWDI rates were before Thrall's entry into the VPP in 1989. The decreases occurring from 1989-1993 may very well have been the continuation of a trend.

A second consideration is that two of the criteria for acceptance into the Star program are decreases in II rates and LWDI rates over the preceding three years. If a company is achieving reductions in these safety and health indicators even before official entry into the program, then it is difficult to determine whether VPP pushed a particular company to improve their safety and health programs or whether this was occurring anyway and the company simply wanted recognition for it.

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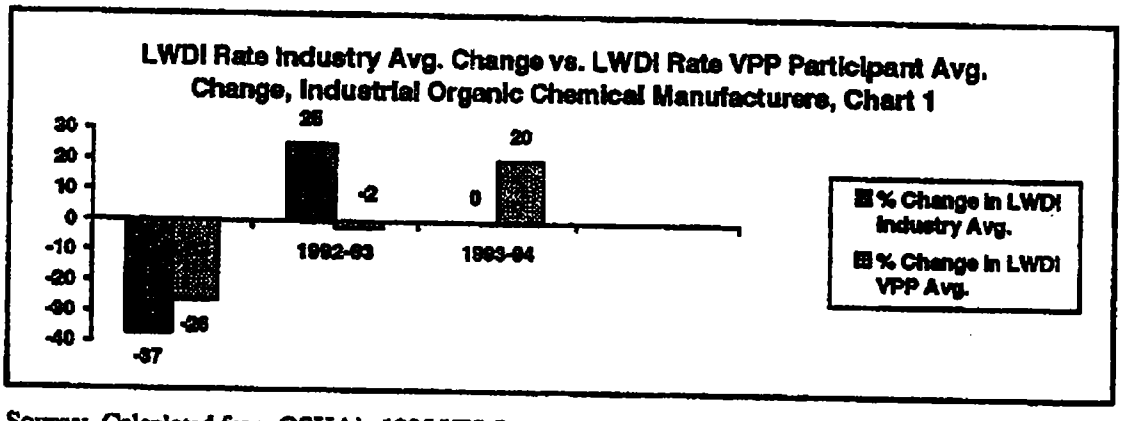
[10] Voluntary Protection Program Participants Association (VPPPA), "Benefits of VPP Participation: Data from VPP Sites", June 1996.

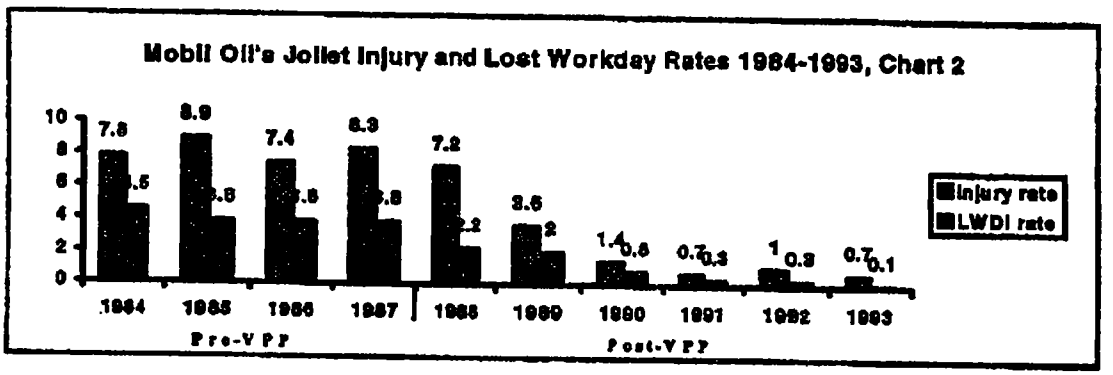
Even a comparison of the percent change in LWDI rates and II rates of companies participating in the VPP with their industry average doesn't reveal much about VPP's impact. The most represented industry in the VPP, manufacturers of industrial organic chemicals, saw average industry II and LWDI rates change more favorably than the average II and LWDI rates of VPP participants for 2 of the 3 years for which data was available (See Chart 1). It is likely that, with the improvement occurring in safety and health performance throughout industry, the industry II and LWDI average are likely to be improving more rapidly than the average of VPP participants in many industries, not just in the industrial chemical manufacturing industry. This reality makes assessing OSHA's VPP quite difficult.



Source: Calculated from OSHA's 1995 VPP Data

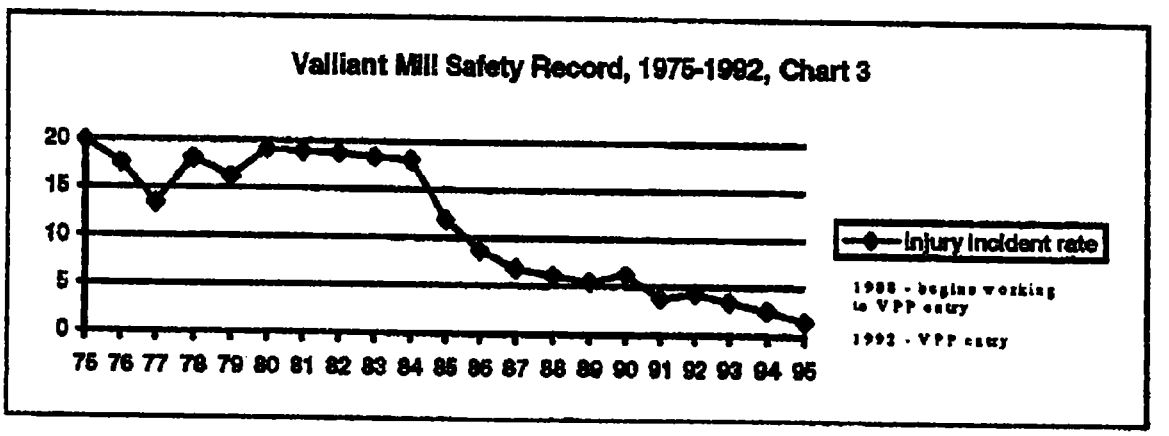
Note: Positive numbers indicate a worsening safety performance. Negative numbers indicate an improving safety performance.

With all this in mind, OSHA and VPPPA do provide some data which indicates that the VPP does improve a site's safety and health performance. Mobil Oil's Joliet, Illinois refinery's LWDI rates from 1983-1987 were 4.5, 3.8, 3.8, and 3.8 respectively. Mobil believed its safety program had "plateaued". It was dissatisfied with this performance and wanted to see improvement. In 1988, the Joliet refinery began implementing VPP safety and health programs. Following OSHA's VPP framework, Joliet increased employee involvement and top management participation and improved documentation which allowed Joliet to refine its safety and health program. By 1993, two years after its approval to the Star program, its LWDI rate was 0.1 (See Chart 2).



Source: Voluntary Protection Program Participant's Association. "Benefits of VPP Participation: Data from VPP Sites," 1994.

The Weyerhaeuser Paper Company provides another good example of how the VPP improves a site's safety and health performance. Valliant Mill, producers of pulp and paper container board in Oklahoma, like Joliet, believed its safety and health performance had "plateaued" in 1988. As a result, Valliant began using OSHA's expertise in an attempt to qualify for the VPP and to further improve its safety and health performance. In 1992, OSHA approved Valliant for the Merit program. 1994 witnessed Valliant's entry into the Star program. Even though Chart 3 seems to indicate improvements were already occurring before Valliant's VPP association, Roger Strain, Valliant's safety and health manager, maintains further improvement probably would not have occurred without OSHA's expertise.



Source: Voluntary Protection Program Participant's Association. "Benefits of VPP Participation: Data from VPP Sites," 1994. Roger Strain, Safety and Health Manager of Valliant provided data from 1993 to 1995.

Why do some sites participate and not others? Companies generally leave site participation to the discretion of local site managers. Sites that do not participate generally believe that VPP uses too much time and too many resources to be worthwhile. However, the sites that do participate believe the benefits outweigh the costs. The benefits of participation will be discussed in the following section.

What are industry's incentives for participating in VPP?

There are a number of reasons for the participation of companies in OSHA's VPP. One reason for VPP participation is the recognition it brings to companies. Companies are always looking for a competitive edge. Some companies believe VPP participation enhances their image in the eyes of their customers. For instance, many of the customers of Fisher Controls, manufacturers of rotary and ball control valves, are companies that also participate in the VPP. Fisher believes its participation in the program increases its attractiveness to potential buyers of its products.

A second reason for VPP participation is that OSHA provides a set of fresh, independent eyes to inspect a site's safety and health program and to evaluate its quality. OSHA provides external validation that a company's safety and health program is operating effectively. OSHA inspects Star participants once every three years. If a participating Star site has been inspected once and is in good standing, OSHA performs subsequent inspections as infrequently as once every five years. OSHA's VPP onsite inspections are more frequent and more thorough than OSHA's programmed compliance inspections, which occur as infrequently as once every 20 to 30 years. OSHA's VPP onsite inspections require safety specialists and industrial hygienists to spend up to two days to exhaustively examine the worksite to identify the types of hazardous conditions that might exist. Some companies insist that one motivation for entering the program is subjecting the site to OSHA's expert evaluations. The evaluations usually result in recommendations that lead to refinement of a company's safety and health program.

The fact that more time and resources seem to be spent scrutinizing Star program participants, the best examples of excellence in safety and health performance in industry, than other companies seems to indicate that OSHA's priorities may be misplaced. However, it is important to realize that OSHA's average programmed inspection time period of 20 to 30 years per company is misleading. OSHA inspects the most hazardous companies, which it determines based on injury and illness rates, far more frequently, as often as every couple of years. In addition, no companies are exempt from OSHA's investigation of employee complaints. One aspect of the Star program which is appealing to Star participants is the fact that any situation that involved employee endangerment would be resolved cooperatively with OSHA. OSHA's inspectors would not storm a company's property or take any enforcement action unless cooperation did not resolve the problem.

OSHA justifies their use of resources in this way by pointing out that the direct impact of VPP evaluations is greater than OSHA compliance inspections. What is the evidence for this? OSHA data show that an average of 91 employees are covered by each OSHA compliance inspection; an average of 756 employees are covered by each VPP onsite evaluation. Every hour of OSHA compliance activity covers 3.0 employees; every hour of VPP activity covers 8.3 employees.[11] However, one could argue that the impact of OSHA compliance inspections, even if they target fewer employees per inspection, might very well be more important because a typical OSHA site has much greater room for improvement than a Star site which by definition is supposed to be among the best in its industry.

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[11] Catanzaro, Gerry. "Answers to Some Frequently Asked Questions on VPP", *Job Safety and Health Quarterly*, Summer 1994, p. 22.

A third reason for VPP participation is that it allows companies to have a good relationship with the regulator. Working cooperatively with the regulator means a company's views and concerns are more likely to be incorporated during formulation of regulations and enforcement guidelines. Companies have gradually come to realize that OSHA's commitment to cooperation is genuine. This in part accounts for the increase in company VPP participation from 51 in 1995 to 98 in 1996. Cooperation is a contrast to the adversarial relationship that often typifies OSHA/industry relations.

The VPPPA cites employee benefits as another incentive for participation in the VPP. VPP participants report higher morale among employees, increased productivity, decreased absenteeism, and an increase in the quality of production. Unfortunately, VPPPA provides little data to substantiate these claims. For example, VPPPA points out that the Ford New Holland Plant in Grand Island, Nebraska experienced a 13% increase in productivity and a 16% decrease in scrapped product that needed to be reworked during its first three years in the VPP.[12] Nothing is mentioned about what levels of productivity increases and scrapped product decreases were before entry into VPP. They may very well have been greater. Also, it is possible that the productivity increases were due to other factors such as improved technologies or management strategies.

A final and perhaps most important reason for VPP participation is its impact on a company's bottom line -- its profits. OSHA's inspections, program requirements, and evaluations of VPP participants, though only partially responsible, are almost certainly due some credit for reducing II and LWDI rates. The decline in II and LWDI rates enable these sites to have lower worker compensation premiums and insurance rates. So not only is the workforce benefited with safer working conditions, but a company's competitiveness is enhanced.

For instance, the Monsanto Chemical Group in Pensacola, Florida reported workers' compensation costs of $168,000 in 1989, the year of its VPP approval. Four years later, the facility experienced workers' compensation costs of $87,000.[13] Mobil Oil Corporation's Paulboro, New Jersey Refinery experienced even more dramatic savings. Mobil Oil Paulboro reported worker's compensation costs of $200,000 in 1991, and costs of $22,000 in 1994, the year the facility was approved into the VPP.[14] Again it is important not to interpret this data out of context. Certainly, companies don't need OSHA's VPP to look out for their profit margin. They probably would have achieved most if not all these reductions on their own without VPP. However, OSHA's VPP does provide an extra set of eyes, a forum for recognition of safety and health excellence, and an opportunity to develop a cooperative relationship with the regulator.

Policy Implications/Lessons for Future Initiatives

What is to be learned from this look at OSHA's VPP? One lesson is that even a program that's almost 14 years old and that seems to save companies money and provide other benefits, still has a very low participation rate. One reason for this is that many companies believe they

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[12] VPPPA.
[13] Ibid.
[14] Ibid.

have excellent safety and health programs already, so the cost in time and resources of participating in OSHA's VPP does not justify the marginal benefits.

A second lesson from the program is that it is difficult to get small companies to participate in the program primarily because they lack the resources of the larger companies. Yet it is the smaller companies, because of their lack of resources to develop extensive safety and health programs, that most often need the expertise that the VPP is able to provide.

A third lesson is that there is no perceived need on the part of OSHA to provide convincing evidence that the program is working; self-evaluation is not a part of its culture. OSHA does provide some data which it believes validates the program to some extent. However, the data OSHA presents, as discussed earlier in this paper, is not convincing. OSHA presents little data on the performance of companies before they entered the VPP, so the impact of the VPP on these company's LWDI and II rates is unclear.

7. GENERAL CONCLUSIONS

Program Evaluation

The most important conclusion about the federal programs examined is that four of the five programs (SO_2 emissions trading is different in almost every way from the other four programs) are peripheral, both to business and society. They do not address most of the important problems with the pollution control system nor do they contribute significantly to improving environmental quality.

OSHA Star and the programs related to it have succeeded in establishing a positive image, but it is very debatable whether the programs have made any major contribution to occupational safety and health. OSHA has no information to support such a contention. Of the few companies we talked to who had facilities participating in the OSHA program, some thought the Star program contributed to improved worker safety, others did not think so. From the perspective of OSHA, the programs allocate scarce resources to the facilities that least need it. From the perspective of participating companies, the programs improve the working relationship with OSHA, but most companies hardly ever see an OSHA inspector anyhow.

XL and CSI may be too new to evaluate with any certainty, but there is no indication that either program will make a major contribution to environmental improvement or to lowering the cost of the pollution control system. Both programs have contributed to improved communications among the interested parties, but the other side of this coin is the high transactions costs of participating in either program. As of this writing, it seems quite possible that the high transactions costs and low pay-offs will result in the demise of one or both programs.

33/50 is quite different from XL and CSI in that the transaction costs of participating were close to zero. The minimal threshold for participation and the looseness of the criteria for success make it difficult to know how much impact 33/50 had. It has met its goals, and the group hired to impartially evaluate the program believes that the existence of the program did contribute to the reduction in toxics that was achieved. A number of industry people believe that the program was instrumental in reducing toxics emissions. However, it is debatable whether a program like 33/50 could be successful today.

It is worth examining why the three EPA programs have not achieved more. We think there are three major reasons: 1) the lack of a statutory base; 2) EPA management; and 3) pervasive mistrust.

The pollution control system, to an even greater degree than most government programs, is driven by legislative mandates. What gets done, when it gets done, and how it gets done are all determined by the statutes and the litigation that follows the statutes. It is therefore very difficult to make any non-statutory program work. Decisions are difficult to reach, because in the absence of statutory authority consensus must be the mode of decision-making. Business participants steer the programs to peripheral matters because their general counsels caution them against taking any action that might result in litigation, and EPA cannot provide protection against third-party suits. EPA personnel give the non-statutory programs low priority because most of their effort is devoted to meeting requirements set by Congress and the courts.

We do not have enough information to pass judgment on EPA's management of the programs. However, there is good evidence that for all three programs the advanced planning in EPA was inadequate. This made less difference for 33/50 than for CSI and XL. For the latter two, the agency seemed uncertain about what it wanted to accomplish or how it planned to do it. Also, because the agency is organized and structured to implement statutes, the organization to implement the non-statutory programs is ad hoc and not well coordinated with the rest of the agency.

Pollution control efforts are generally characterized by mistrust and paranoia. Each of the major elements—business, enviros, EPA, the states, Congress—tends to think that the other elements are intent on undermining the public interest and that these other elements have a major advantage in whatever battles take place. In this climate, programs that depend for their success on cooperation, voluntariness, and trust do not fare well.

The SO_2 emissions trading program has been successful in lowering compliance costs, although it is difficult to separate the effect of the trading provisions from the effect of the other SO_2 provisions in the 1990 CAAA. At the least, it can be said that flexibility in meeting standards sharply lowers the cost of meeting the standards, and that trading can be an important component of flexibility. As with XL and CSI, SO_2 trading is a relatively new program, and a much more definitive evaluation will be possible in the future.

A final important note with regard to evaluation is the inadequacy of efforts by the responsible agency to evaluate the success or failure of the programs. 33/50 is an exception to this—in response to criticisms of the program by GAO and others, EPA did build in an ongoing evaluation of the program. But the other four programs lack such capability. If the agency, Congress, and the public are supposed to learn something from these programs then it is essential that the implementing agency provide a neutral ongoing evaluation. In the absence of such evaluation, judgments about the program will be based on politics and the skills of the spin doctors—not an effective basis for making public policy.

Business incentives

Just as it is difficult to find a regulation that fits all firms, it appears that there is no single incentive that appeals to all businesses. In fact, it is difficult to find a voluntary federal initiative that appeals to business at all. Four of the five initiatives we examine are largely voluntary programs. Some of the OSHA VPP is codified, but participation is not mandatory. The sulfur dioxide program, established under Title IV of the Clean Air Act Amendments, is an exception and thus participation rates cannot be used as a proxy to test whether the incentives under the program are attractive to business.

Our analysis of participation rates under the four voluntary federal programs studied show that the initiatives tend to attract very few businesses. Of the four initiatives, 33/50 has attracted the most participants, followed by OSHA Star. Of the 8,000 manufacturers invited by EPA to join 33/50, about 14 percent signed on. Similarly, there are about 98 companies with 231 work sites enrolled in OSHA's VPP program. Only ten facilities of extremely large U.S. market-leaders are implementing XL project plans. About 20 companies participate in CSI.

Table 7-1 shows that the different federal initiatives tend to feature different types of business incentives. Incentives depend in part on the goals of the program and types of firms that are targeted. For example, the goal of the emissions trading program is to lower the cost to firms of complying with sulfur dioxide reduction requirements of the Clean Air Act Amendments. To achieve this, the program targets a relatively narrow group of similar firms that emit large amounts of the substance, and are thus comprise a potential market of buyers and sellers of emissions.

As Table 7-1 illustrates, the SO_2 emissions trading program offers participants the most tangible economic benefits. Direct financial incentives under the program include both market emissions trading provisions, as well as greater flexibility in how firms may achieve reductions. In contrast to the sulfur dioxide program, 33/50 is designed to provide participants with greater public recognition. OSHA VPP is advanced as an excellent way to improve relationships with regulators. As originally conceived, CSI was designed to appeal to some firms that sought to improve relationships with suppliers and with other firms in a sector.

Table 7-1

Business Incentives Contained in Five Federal Initiatives						
	Direct financial	Indirect financial	Public recognition	Regulatory relations	Corporate customer relations	Public customer relations
33/50			X			X
OSHA Star				X	X	
SO_2 Trading	X					
CSI		X			X	
Project XL		X				X

Because the goals and the incentives under the five initiatives vary, business participants offer different reasons for selecting particular programs. 33/50 and OSHA Star both appeal to companies because the initiatives tend to dovetail with internal company programs. Firms also are attracted to clear, demonstrable goals. 33/50's emission reduction goals that are gauged by the Toxics Release Inventory rate highest in this regard. Firms also are attracted to tangible rewards such as OSHA Star's decreased oversight and reporting provisions. Firms also prefer simple initiatives. 33/50 requires companies to do little more than sign a letter and a pledge to try to work toward program goals.

The experience with 33/50 demonstates two important general themes. First is the importance of simplicity. When EPA tried to initiate a follow-up program but with additional checks and controls, potential industry participants balked at the controls and declined to participate. The program never got underway. The second theme gets to the reason for initiating such controls. Environmental groups had misgivings about 33/50 because of the lack of any controls, and some groups argued for third-party audits to check on the results achieved by facilities. The enforcement office in EPA similarly was uncomfortable with a program in which compliance could not be enforced through litigation. There is a fundamental conflict between the business community's desire for flexibility and simplicity and the environmental community's

desire for certainty and enforceability. Lack of trust underlies the environmentalist perspective and until some way can be found to increase mutual trust the fundamental conflict will remain.

CSI and Project XL are generally unappealing to most businesses because they require company employees to attend numerous meetings, draft lengthy plans and progress reports, and solicit public input. Also, because CSI and XL depart so significantly from the existing regulatory system, non-participants perceive the probability of success of these two initiatives as fairly low. Still, for a handful of business, CSI and XL's potential payoff are great enough to warrant the time and resource commitments. XL participants are attracted to the potential for innovative regulatory flexibility and the chance to solve problems creatively.

In summary, while the federal initiatives we examined may tell us whether the program provided appealing incentives for the targeted industry, they cannot tell us whether such incentives work for all businesses. For example, 33/50 targets large manufacturers that emit and transfer large amounts of toxic emissions. It is unclear whether such a system would appeal to small service industries whose emissions tend to fall below TRI reporting thresholds. Similarly, the direct financial incentives offered under the emissions trading program targets a fairly narrow group of firms that emit large amounts of sulfur dioxide. It may be more difficult to use emissions trading schemes in cases where one facility tends to account for most of the major releases of a certain type of pollutant, or where there are a large number of small sources.

Thus far, our discussion assumes that federal regulatory agencies have the ability to devise and implement programs that provide significant business incentives. Even if there were conclusive data to isolate what incentives among the federal initiatives works best, business would still have to agree that federal regulatory agencies are the best source of such incentives. While there is currently little agreement on what types of federal initiatives work best, there is even less agreement among business whether the federal government should administer such programs.

Many businesses want state agencies to have greater authority for crafting and administering initiatives. Some smaller businesses do not want initiatives, but simpler reforms, such as one-stop permitting schemes. In contrast, some large, multinational corporations seek incentives that help them to compete in a global economy.

The diversity of viewpoints is not merely a function of the diversity of business. Even business associations which share similar goals and company characteristics, such as GEMI, have difficulty agreeing on what types of incentives are most desirable.

While it is difficult to state with any certainty what types of business incentives are most desirable, the five initiatives do illustrate what *program* features business find most appealing. It appears that simplicity is the rule. Attractive programs and initiatives such as 33/50 and OSHA VPP tend to mirror ongoing EHS programs within firms. Business also prefers initiatives with clear goals and objectives. Initiatives that require significant employee time and other resource commitments are not as appealing as initiatives such as 33/50 which require little more than a corporate signature and good faith efforts to meet program goals.

For the handful of firms that want to commit company hours and budgets to intensive programs such as CSI and XL, regulators should give them the opportunity to do so. But in

doing so, regulators also must understand that unless such bold initiatives deliver demonstrable results, most businesses will prefer to invest their time and effort elsewhere.

Lessons for the Future

There is widespread discontent with the existing regulatory system. This can be determined by talking to almost any of the regulated or any of the regulators, and it is highlighted by the peculiar phenomenon of the EPA Administrator putting the highest priority on agency efforts to circumvent the basic statutory system that is supposed to govern the agency's actions.

There is not a consensus on how to change the existing system. Although there is agreement on some abstract principles, e.g. there should be more flexibility and greater efficiency, the agreement breaks down as soon as specific measures are proposed. Even among large corporations, there is disagreement over such basic questions as whether existing standards should be maintained and whether standard-setting should be decentralized to the states.

Given the lack of consensus, if the badly broken pollution control system is to be mended it will have to be done through some problem-solving negotiating mechanism. It so happens that the Founding Fathers in their great wisdom provided just such a mechanism in the form of the U.S. legislative system. A basic conclusion to be drawn from our look at the administrative attempts at reform is that there is no short-cut, no way around the difficult task of trying to legislate a better system.

There are a few other lessons that are worth reiterating here, in part because they are simply elements of good public administration and are thus applicable to any program that EPA or OSHA might undertake:

- More advanced planning about the goals and procedures of the programs would have saved a lot of mistakes and delays at later stages;
- Clear goals and simple procedures are major assets of a program and are important incentives for business participation;
- There should be agreed-upon measures to document program accomplishments and progress;
- The lack of program evaluation efforts impedes efforts to draw the correct lessons from a program and leaves it vulnerable to any politically convenient interpretation.

Industries of the Future

The Industries of the Future strategy creates partnerships between industry, government, and supporting laboratories and institutions to accelerate technology research, development, and deployment. Led by the Office of Industrial Technologies within the Department of Energy's Office of Energy Efficiency and Renewable Energy, the Industries of Future strategy is being implemented in the seven energy- and waste-intensive industries listed below.

These industries use more than 80 percent of the energy consumed in all U.S. manufacturing. Two key elements of the strategy include an industry-driven document outlining the industry's vision for the future and a technology roadmap to outline the technology that will be needed in order to reach their goals. Through this process, government-funded research is brought to a sharp focus to benefit U.S. industry. To the extent that visions and technology roadmaps have been completed, OIT has outlined research needs.

Industries of the Future Overview Briefing

Aluminum - Works in the refining of alumina to the fabrication of a broad range of products from beverage cans to aircraft and construction materials.

Chemicals - Produces over 70,000 different products ranging from basic commodity chemicals, such as sulfuric acid and plastics, to mass-marketed consumer goods such as drugs, detergents, and paints.

Forest Products - Produces wood and paper products for a wide variety of consumer goods, such as stationery and paper tissues, and industrial products, such as cardboard packaging and paper for newsprint.

Glass - Produces and fabricates a diverse set of products: flat glass, largely used for windows; glass containers, such as for bottles; fiberglass for insulation and structural applications; and specialty glass, such as optical fibers.

Metalcasting - Melts and casts mostly scrap metal into literally tens of thousands of intricately shaped metal parts that are used in the assembly of over 90% of all durable goods and in virtually 100% of machine tools, manufacturing machinery, and similar capital goods.

Petroleum - Converts crude oil into fuels and feed stocks used in a wide range of products for transportation, industry, electrical generation, and heating.

Steel - Makes, shapes, and ships steel products, one of the most basic and widely used metals, to many markets such as construction, automotive, and machinery.

Agriculture - New team which is focusing on renewable bioproducts and the food processing industries

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EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

SENIOR ECONOMIST

7 August 97

MEMORANDUM FOR TODD STERN

From: Rosina Bierbaum
Jason Shogren

RE: Voluntary programs for climate change

Background.

You asked for information on the existing voluntary programs to reduce greenhouse gas emissions. Here is our initial response based on a quick review of the literature. If you wish, we can get more detailed information or arrange for briefings.

The Climate Action Plan (CCAP) put into place by the USG in 1993 consisted of over 40 voluntary actions across most sectors: residential and commercial buildings, industry, transportation (only a few), energy supply, forestry, and land-use changes. These CCAP actions were projected to reduce emissions by 108 million metric tons of carbon (MMTC) by 2000, enough to return US emissions to 1990 levels (if energy prices had remained high and the US economy had not grown so vigorously). In the US National Communication (required by the framework convention) released yesterday by the State Department, USG now estimates that CCAP will reduce emissions by 76 MMTC in 2000. To date, however, the best DOE and EPA guess is that today these programs have achieved over 15 percent (12-14 MMTC) of this revised goal.

Two factors that have limited the effectiveness of CCAP are: (1) funding levels have been at about 50 percent due to Congressional opposition; and (2) the energy prices have fallen more than expected. Also 11 of the 44 programs have been terminated.

How well have the voluntary programs worked thus far?

- **CCAP**. There has been little evaluation of the effectiveness of the CCAP program. In June, GAO released its review of four EPA's voluntary climate change programs. GAO concluded that "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 with the fourth program (the coalbed methane outreach program)." One page summaries of the four programs are attached. Participation rates have fallen behind expectations.

- **Other voluntary programs**. For other environmental issues, a recent review of several voluntary industrial programs concluded: "we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system." The programs that seem to have worked had relatively simple and clear objectives understood by both the government and business; enabled participants to have a major voice in the establishment of goals; and granted significant flexibility for implementing program objectives. In general, these programs mandate performance goals rather than technology. Not surprisingly, industry liked programs that increased economic benefits, competitive advantage, and flexibility. It might be worthwhile to examine in more depth the elements of some of the programs (33/50) that GEMI finds successful.

- **DOE's Industries of the Future program**. This program is a collaborative effort between industry and government to develop "technology roadmaps" to reach goals of energy-efficiency and "competitiveness" in seven industries. The industries are aluminum, chemicals, forest products, glass, metal casting, petroleum, and steel. Although the program is only a year old, DOE is now actively funding RFPs consistent with the roadmap. This new effort could serve as a basis to develop further voluntary actions with industry since it is already in place.

Attachments: Scorecard of CCAP emission reductions
One-page summary of 4 voluntary climate change programs
"Industrial Incentives for Environmental Improvement" GEMI report
Industries of the Future