Fostering Industry-Initiated Environmental Protection Efforts

Committee on Industrial Competitiveness and Environmental Protection, Commission on Geosciences, Environment and Resources, Commission on Engineering and Technical Systems, National Research Council

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Report of the Committee on Industrial Competitiveness and Environmental Protection
Board on Environmental Studies and Toxicology
Commission on Geosciences, Environment and Resources
and
Manufacturing Studies Board
Commission on Engineering and Technical Systems
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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Executive Summary

Many in government, industry, academia, and other groups have questioned the effectiveness of traditional regulatory approaches (also known as "command-and-control" regulation) as the predominant mechanism for pollution control. The regulatory approach is becoming viewed by many involved in the process as an incomplete environmental strategy. In that context, industry-initiated environmental programs have increased in number and popularity and have come to be seen as an important means of supplementing regulatory activity. Industry-initiated programs can have many desirable aspects, including (1) the potential to address some environmental problems more efficiently than regulation can, (2) the ability to use in-depth industry knowledge of manufacturing processes to develop industry-specific, cost-effective solutions; (3) greater flexibility in methods by which to achieve environmental objectives; and (4) allowance for companies to establish environmental approaches that are consistent with their business goals.

The National Research Council's Committee on Industrial Competitiveness and Environmental Protection was formed to look at efforts undertaken in recent years to foster environmental initiatives within various industry sectors. Specifically, the charge to the committee was to:

Assess (a) ways to enhance and sustain recent 'voluntary' efforts by industry and government facility managers in pollution prevention and energy efficiency, and (b) recent efforts by EPA,

DOE, and other agencies to stimulate, facilitate, and reward such efforts.

The committee gathered information on a variety of programs to elucidate their common elements and some of the factors apparently influencing industry involvement in them. The committee was not charged to evaluate, nor did it have the resources to examine rigorously, the quality of individual programs. Thus, this report does not recommend one type of strategy over another.

The growing number and variety of environmental programs initiated by industry in the United States includes environmental-management programs across entire industry or corporate entities, programs implemented on a project-by-project basis, and programs that seek to improve product- or process-design practices. In general, such programs are not related directly to technical compliance with regulations. Industry's motivations for initiating environmental programs are undoubtedly varied, not well understood, and typically multifaceted. Possible cost savings appear to be an important motivator. Companies tend to believe that programs they design to be compatible with their business culture and production processes are much more efficient and cost effective than traditional regulatory compliance programs.

It is not easy and often not possible to quantify the effectiveness of most industry-initiated programs. Uniform metrics generally are not available to measure progress objectively, baseline data usually are inadequate, and goals (targets) for the programs often are not adequately described so that success can be measured. However, the potential benefits of such programs should not be dismissed merely because they cannot be measured rigorously. It is important to note that most regulatory programs also lack rigorous ways to measure environmental effectiveness or benefits.

NEXT STEPS

Based upon its investigations, deliberations, and collective experience, the committee suggests the following approaches and principles to foster industry-initiated environmental efforts:

Government agencies and other organizations should strive to improve methods to measure independently and evaluate objectively the environmental effectiveness of industry-initiated approaches. Efforts have been undertaken by government agencies and other organizations to encourage industry to begin or continue with self-initiated programs. Such efforts include partnerships between industry and government, between environmental organizations and local communities, and among industry consortia with environmental goals. Those efforts use approaches such as the establishment of industry-initiated environmental management standards, environmental labeling and certification programs, and federal and state programs to provide incentives and recognition for improving industrial environmental performance.

The success of various programs remains largely speculative, and claims of industry successes often are met with skepticism. Better methods for evaluating programs are needed to provide a basis for agreement as to what is successful. By defining measurable goals and developing definitive and objective methods or a common set of principles, industry-initiated environmental programs could be encouraged further. A system for public reporting of environmental performance data by industry would provide all the stakeholders with information sufficient to allow conclusions to be drawn on the overall effectiveness of an activity or program. Such a system would need to take into account concerns about disclosure of confidential business information.

In developing criteria for evaluation of industry-initiated efforts

not involved with regulatory compliance, total net reductions of environmental waste or releases should not necessarily be considered paramount, because those can be greater for larger companies and for companies that have not previously operated efficiently. Rather, evaluation methods might include measures of efficiency, such as waste per unit of product.

Different types of programs need different criteria for evaluation. No one criterion can accommodate the broad diversity of programs and types of industrial activities. An overall environmental management program needs a different form of evaluation than a program that focuses on specific industrial activities. In addition, industries, and sometimes manufacturing processes within an industry, have different environmental issues to contend with and each type should be evaluated with respect to the relevant issues.

Government agencies should strive to make regulatory compliance strategies flexible and adaptable to opportunities for improvement. Many U.S. companies have initiated environmental-protection programs suited for a particular industry or facility. A common sentiment among industry is that specific technical elements of environmental regulations should be flexible enough to permit and encourage such programs by moving towards performance-based regulations which specify performance standards without mandating the means of compliance. New environmental regulations also need to protect the gains made by ongoing projects from being undone. Industry initiatives could be encouraged and sustained by a flexible performance-based regulatory structure that took more fully into account the ability of corporate management to comply with regulations in ways that are most effective and efficient for their enterprise.

OTHER CONSIDERATIONS FOR PROMOTING INDUSTRIAL INITIATIVES

The committee is aware that efforts to recognize innovative programs, supply technical assistance, and disseminate information appear to be successful in some instances. Government agencies and other organizations are encouraged to explore innovative ways of using such techniques to promote industrial initiatives. Public awareness and public image are an important part of the motivation for companies to develop effective environmental programs. Organized and respected forums for recognition can encourage efforts in this area by providing recognition in the form of awards or publicity for innovative programs to improve environmental quality. This approach requires some framework for evaluation and selection by independent panels.

Especially for small manufacturers and businesses, the costs of environmental improvements might be barriers to starting a self-initiated program. If technical assistance is available, the time and costs of researching options and developing a program often is lessened, and more small companies might initiate programs.

If one company has developed an effective environmental management strategy, has overcome barriers, or has developed innovative technology, that information could be useful to other companies. Conferences, other types of meetings, and electronic communications should be used regularly by government agencies and other organizations to disseminate such information to encourage and assist other companies interested in improving their environmental performance.

Examples of industry-initiated environmental programs and efforts to promote such programs are provided in Chapters 2 and 3 as well as the appendices.

1

Introduction

In recent decades, environmental protection by regulation has been the predominant means for seeking to protect public health and the environment from industrial pollutants in the United States. Some regulations have been highly successful in improving environmental quality, but as the number of regulations has increased, the efficacy and cost of regulations applied to waste streams exiting industrial facilities (i.e., "end-of-pipe" regulations) increasingly have been questioned. Some regulations have been questioned as being redundant, inflexible, overly complex, unscientific, or very costly relative to the estimated environmental benefit. Regulatory approaches often have been blamed for isolating segments of society into adversarial "pro-industry" and "pro-environment" groups. Gains for one side often are assumed to represent losses for the other.

But clearly, environmental protection must not be an issue of choosing between regulatory control and industrial success. Increasingly, corporations are recognizing the benefits to the public and to their long-term profitability that result from reducing environmental impacts (Epstein 1996). Also, government is recognizing that environmental protection approaches initiated by industry can sometimes be more effective than those prescribed in environmental regulations. Such efforts are part of a change in the nation's environmental outlook—and evolution from sole reliance on regulatory controls to a multifaceted outlook that combines the goals of environmental protection with long-term business success.

OVERVIEW

In the late 1980s and early 1990s, the number of environmental programs initiated by industry increased sharply, although it is important to note that environmental initiatives had been undertaken by some corporations in earlier years. Programs initiated by industry have included efforts to design processes and products for pollution prevention, waste minimization, and energy efficiency, among others. In general, such programs were not directly related to technical compliance with regulations. As discussed later in this report, these industrial environmental programs are diverse, and reliable methods to determine their effectiveness have not been established or generally accepted.

A variety of nonregulatory programs have been initiated to foster industrial environmental initiatives. They include partnerships between industry and government, national environmental organizations, local community groups, industry consortia with environmental goals, environmental management standards, labeling and certification programs, and state and federal programs for encouraging improved industrial environmental performance. Many industry-initiated environmental programs have been encouraged and aided by government programs, including the Department of Energy's Energy Efficiency and Industrial Technologies programs, the Environmental Protection Agency's 33/50 Program, the Presidential Green Chemistry Challenge Awards, and other federal and state programs. Recent presidential administrations have advocated cooperative efforts between regulators and regulated parties and have promoted flexibility and innovative approaches in combatting pollution (PCSD 1996). Such supporting activities have provided manufacturers with forums to share experiences, as well as relevant information on technologies and management techniques. They also have provided recognition for exemplary

environmental programs, benchmarks, and standards by which to assess progress.

In addition to nonregulatory efforts, some regulatory efforts have promoted environmental initiatives by various industries. For example, the Resource Conservation and Recovery Act of 1976, combined with the high cost of hazardous waste disposal, created incentives for industry to reduce the amount of hazardous waste produced. Also, the 1986 passage of the Emergency Planning and Community Right-to-Know Act (EPCRA)[1] contributed to the growth of industry-initiated environmental protection programs. EPCRA requires manufacturing facilities to report annually on releases and transfers of more than 600 chemicals (if the chemicals are used or produced above a certain threshold amount). That reporting resulted in the creation of a national database called the Toxics Release Inventory (TRI). Publication of TRI data apparently has increased industry's motivation to reduce emissions of included chemicals by providing a highly visible overview of the use and release of toxic chemicals (EPA 1995). Previously, facilities did not normally aggregate and report comprehensive data on their own emissions and those of similar facilities; therefore, quantitative comparisons among facilities and industries were difficult to make.

Regulations obviously will remain an important part of the national environmental-protection strategy. However, effective strategy is not simply a matter of always selecting a traditional regulatory approach (also known as command-and-control regulation). Regulatory requirements can have unintended and unnecessary adverse effects upon business performance, especially if they apply to companies with limited resources or product lines (OTA 1994). Another type of regulation, known as performance-based

[1] EPCRA was enacted as Title III of the 1986 Superfund Amendments and Reauthorization Act.

regulation, requires that a specific outcome be achieved without mandating the means of compliance. Such regulation can help provide flexibility and reduce compliance costs. Flexible regulatory programs can enable companies to find ways to comply with standards in a less burdensome manner.

As an example of potential cost savings provided by regulatory flexibility on an entire-facility basis, the Amoco-U.S. EPA Pollution Prevention Project, Yorktown, Virginia (Amoco 1992), concluded that more cost-effective environmental protection programs could be designed by allowing a facility the flexibility to accommodate site-specific factors in its efforts to meet environmental objectives. The study reported that, by assessing various methods to reduce pollutant releases from the Yorktown facility, about 95% of the release reductions required by regulations and statutes can be achieved for 20–25% of the costs for these programs. The study revealed large unregulated emission sources due to loading operations that could be controlled more cost effectively than the emission reductions achieved by existing regulations.

Regulatory efforts might be used in concert with programs that rely on industry-initiated efforts. Compared with regulations, industry-initiated programs can appeal to government and industry in many ways:

- Traditional regulatory approaches promulgated at federal, state, and local levels are not always coordinated with each other, even within a given governmental level. Some redundancy or inconsistency among regulatory requirements is inevitable, as is considerable paperwork.
- Industry experts know their manufacturing processes best. Often the public officials writing and enforcing regulations do not have much background in the industry sector to which the regulations apply. Industry-initiated programs can enable those who are

most familiar with products and processes to develop appropriate and cost-effective solutions.

- Regulations sometimes require industry to use methods that might not be the most efficient way for a particular facility to meet environmental standards. Industry-initiated programs can enable industry to use a more efficient approach in achieving a desired environmental benefit.

Although self-initiated programs might be appealing to industry, efforts to promote such programs may be threatened as industry and government facility managers assess whether to take further self-initiated action after the most easily achieved environment goals are met. Companies generally must make decisions based on the realities of the marketplace. A material substitution that is beneficial to the environment might cause the price of a product to increase or might change the quality of the product. In such cases, a company might be reluctant to undertake a material substitution, especially if it might cause a reduction in sales. In addition, new self-initiated efforts might lose their attraction if a business fears that new regulations might be put in place regardless of the amount of resources spent on recent self-initiated efforts.

According to a survey of environmental managers at 185 corporations in the United States and Canada, many companies have not integrated environmental improvement into business decision making and have not recognized it as an important business issue. The respondents indicated that two common problems often impede a company's ability to improve its environmental practices: (1) lack of integration between environmental and business issues in the company, and (2) failure of top management to recognize that the environment is an important business issue (ADL 1995).

Based on interviews with 25 current or former industry executives responsible for environmental, health, and safety, Yosie and

Herbst found that many companies have made progress in integrating environmental activities with other business functions and reducing costs, but the ability of environmental programs to contribute to revenue was unclear (Yosie and Herbst, 1996).

SCOPE OF THE REPORT

Current environmental activities can be divided into three broad types of efforts: mandatory efforts (regulated by government), nonmandatory industry efforts at standardization, and industry-initiated efforts (not covered by the first two categories). The focus of this report is on industry-initiated efforts, and to a lesser extent, nonmandatory industry standardization efforts.

The National Research Council's Committee on Industrial Competitiveness and Environmental Protection prepared this report on nonregulatory efforts undertaken in recent years by manufacturing industries, DOE, EPA, and others to enhance and sustain environmental efforts initiated by industry and government facility managers. The committee included members with expertise in industrial economics, environmental regulation, manufacturing, toxic chemical releases, engineering, and management. It included experts with perspectives of industry, academe, national environmental organizations, and citizens organizations.

The committee was not charged to evaluate, nor did it have the resources to examine rigorously, the costs and benefits of the industry-initiated efforts or to assess technological, regulatory, and economic policy barriers to increased use of innovative techniques for objectives such as pollution prevention or increased energy efficiency. Specifically, the committee was charged to:

Assess (a) ways to enhance and sustain recent 'voluntary'

efforts by industry and government facility managers in pollution prevention and energy efficiency, and (b) recent efforts by EPA, DOE, and other agencies to stimulate, facilitate, and reward such efforts.

This report illustrates the kinds of industry-initiated efforts that can lead to environmentally beneficial results that are endorsed by interested third parties, and advantageous to corporations (economically or in other ways). The report discusses steps that government agencies might take to promote industry-initiated efforts and to broaden the range of effective environmental-protection approaches.

2

Examples of Industry-Initiated Environmental Programs

Industry's motivations for initiating environmental programs are undoubtedly varied, not well understood, and typically multifaceted. Possible cost savings appear to be a major motivator. The descriptions presented in Table 2.1 illustrate a range of approaches and perspectives relevant to industry-initiated environmental efforts. The information was provided by companies in response to requests from the committee; additional descriptive information is provided in Appendix A.

Many corporations emphasize the attractiveness of combining environmental protection efforts to achieve savings in human resources, time, material, and product and environmental quality. All of the programs cited in Table 2.1 claim significant benefits to the enterprise as well as to the environment.

Regarding other motivations, the public image aspect of such activities is an obvious benefit. Many corporations, regardless of size, publicize their self-initiated programs to demonstrate their commitment to environmental protection to customers, regulators, and the public. Such information also can help to attract employees, increase employee loyalty, and encourage employee participation in environmental programs.

Pressure from customers, suppliers, community leaders, environmental groups, and regulatory agencies can influence corporate decisions to initiate or participate in voluntary programs. However, in most cases, management must be committed to an effort for it to be successful.

Table 2.1 Examples of Industry-Initiated Environmental Programs[1]

Company Name	Type of Environmental Program	Intended Benefits of Program	Reported Factors in Program Success
3M	*Pollution Prevention Pays* program involves efforts to prevent air pollution, water pollution, and solid-waste generation. Reductions are compared with environmental releases of first project year.	Develop technically sound, cost-effective approaches. Enhance strong environmental culture throughout the company.	Strong commitment from top management that incorporate program objectives.
Dow	*Waste Reduction Always Pays* program provides financial support for internal projects that reduce waste or emissions. It recognizes successful projects and individuals involved in those projects.	Stimulate a cultural shift in thinking of Dow employees concerning waste reduction and emissions reduction. Make real environmental progress and reduce long-term costs.	Because it is done on a project-by-project basis, WRAP is simpler and probably easier to emulate than companywide programs.

[1] Information presented in this table was taken from responses provided to a committee survey of various corporations. See Appendix A for more detailed information.

Company Name	Type of Environmental Program	Intended Benefits of Program	Reported Factors in Program Success
Lucent	Streamlined life-cycle assessments to identify useful actions in designing products for reducing environmental effects.	Product designers make environmentally preferable choices that would otherwise not be made.	Training personnel to perform streamlined life-cycle assessments.
Ford	*Manufacturing Enviromnental Leadership Program* to prevent pollution at early stages of process and product development.	To reduce or eliminate use of materials of concern, promote recycling, meet or exceed regulatory requirements, protect wildlife habitats, obtain supplier involvement.	Overcoming communication difficulties within a large organization. Full commitment from top management.
Corning	Use materials substitution and process modification to reduce waste and pollution from core manufacturing processes without decreased product quality.	Reduce or eliminate use of materials such as arsenic, lead, barium, and chlorides.	Gaining customer acceptance of the modified products.

Company Name	Type of Environmental Program	Intended Benefits of Program	Reported Factors in Program Success
Jamestown Paint Company	Recycling, reuse, and waste reduction.	Improve product quality, cut costs, and prevent pollution.	Active employee participation and total commitment from management throughout the company.
Cerdec Corp./ Drakenfeld Products	Reduce solid wastes, improve worker safety and health.	Substantial reductions in waste generation, accident frequency, and blood lead of workers. Increase product output.	Making its program exportable to member companies in Europe.

The financial ability of a company to initiate voluntary environmental programs is a factor in whether such programs are undertaken. Small companies have limited resources, finances, personnel, and technical abilities, and therefore might choose not to expend resources on voluntary activities if the benefits are not readily discernable. Even within larger companies, environmental initiatives sometimes must compete for capital with other types of investments.

EVALUATING INDUSTRY ENVIRONMENTAL PROGRAMS

The immediate objectives of industry-initiated environmental programs are generally to reduce emissions, waste, and energy

consumption while being economically efficient. However, evaluating the environmental effectiveness of such programs is intrinsically difficult. Despite many successes reported by companies involved in environmental initiatives, the effectiveness of industry-initiated programs is difficult to assess independently due to the lack of information regarding the resulting environmental effects. Often, no uniform metrics are available to measure progress objectively, baseline data usually are inadequate, and goals (targets) for the programs often are not fully described so that success can be measured. As a result, many of the programs that are deemed highly successful by a particular company, partnership, or regulatory group, are questioned by others. Without good data and well-defined metrics, the merits of the programs cannot be verified independently. Technical difficulties involved in accurately characterizing emissions, the broad diversity of manufacturing processes and products, a lack of adequate toxicological data regarding the hazards of chemicals, and disagreement over the true environmental benefits of different activities all add to the uncertainty surrounding assessments. It is important to note that many regulatory programs also lack a rigorous assessment of environmental effectiveness.

Despite the difficulties in evaluating industry-initiated programs, the committee believes, based upon the information gathered, its deliberations, and its collective expertise and experience, that business and the environment both benefit from programs that fit the business culture and achieve desirable environmental objectives. Although it often is not possible to quantify the effectiveness of industry's programs, their potential positive effects should not be dismissed merely because they cannot be measured rigorously. However, every industrial initiative is not necessarily an effective effort for protecting or improving environmental quality.

NEXT STEPS

Self-initiated corporate environmental programs, most of which started only recently, need time to accumulate experience and specific data. More baseline data are needed regarding chemical use, waste generation, energy consumption, environmental releases, and transfers of waste to other facilities. Such information will help to identify new opportunities for government and industry for environmental improvement. Additional information is needed on the environmental fate of manufactured products.

Until sufficient data are obtained, a pertinent and practical question to ask is whether available information indicates that these programs are at least heading in the right direction in their efforts to improve environmental quality.

To make the programs more widely acceptable and to verify effectiveness, government agencies and other organizations should direct substantial effort toward establishing commonly accepted metrics, data-gathering, and publically-accessible reporting systems that will provide all the stakeholders with information sufficient to allow conclusions to be drawn on the overall effectiveness of an activity or program.

3

Promoting Industry-Initiated Environmental Programs

The increase in industry-initiated environmental programs has been paralleled by an increase in programs that provide recognition, incentives, information, and technical support for industrial facilities and corporations in such efforts. Table 3.1 lists a variety of such programs. Appendix B presents additional descriptive information provided to the committee by individuals involved in the activities listed in the table.

Some of the same difficulties in evaluating industry-initiated environmental programs also are faced when attempting to evaluate programs that seek to encourage industry's voluntary efforts. EPA's 33/50 program is discussed below to illustrate the difficulties in evaluating effectiveness and assessing motivations of participants even when the program has quantifiable goals that were achieved.

EPA'S 33/50 PROGRAM

The 33/50 program is a voluntary pollution-reduction initiative sponsored by EPA. The name stems from its goal of reducing environmental releases and off-site transfers of 17 high-priority toxic chemicals by 33% by 1992 and 50% by 1995. Incentives for industry participation in the 33/50 program include public recognition by EPA and special awards for outstanding achievements in pollution prevention. Unlike mandatory programs, this voluntary program allows firms the flexibility to make the emissions reductions reduc

tions through ways that are most cost-effective for them. Moreover, EPA provides assistance by conducting regional pollution-

Table 3.1 Efforts to Promote Industry-Initiated Programs

Type of Effort	Intended Benefits
Environmental management standards	Provide a nonregulatory means to certify the approach that a company uses to pursue environmental goals.
Environmental labelling of products	Promote accurate environmental advertising. Encourage consumers to take environmental considerations into account. Provide a market-based incentive to manufacturers to achieve environmental goals.
Industrial consortia	Share environmental-management information among member companies and promote the use of effective tools for environmental management.
Partnerships between industry and other organizations	Help establish mutual environmental objectives and develop and implement consensus action plans.
Federal programs	Provide companies with technical support and information. Encourage flexible and cost-effective approaches to implementation of environmental activities.

prevention workshops and by providing access to the agency's Pollution Prevention Information Exchange System. The 1988 Toxics Release Inventory is the baseline against which success is being measured. According to that criterion, the 33/50 program achieved its 1992 goal one year early. By 1991, total releases and transfers of the 17 chemicals had already been reduced 33% from 1988 levels. Recent data suggest that the program also achieved its 1995 goal of a 50% reduction a year early.

However, EPA's evaluation was unable to separate the effect of the 33/50 program from the effects of other activities. Any reductions that a company achieved between 1988 and 1990, regardless of the reason, contributed to the 33/50 program's goals. A company that substituted one chemical for another because of technologic advances would have been credited with reduced emissions for the original chemical. The U.S. Government Accounting Office found that among participating firms, emissions reductions had been initiated well before the 33/50 program began, suggesting that other forces were also at work (U.S. GAO, 1994). Trying to sort out the extent of emissions reductions due to participation in the 33/50 program rather than to the influence of other programs, regulations, or market trends would be a very difficult undertaking.

An independent evaluation of the 33/50 program sought to distinguish the effects of participation in the 33/50 program from other factors that might have influenced reported reductions in releases and transfers of the 17 targeted chemicals (INFORM 1995). That evaluation concluded that companies were motivated by numerous factors, including the effect of regulations and economic costs, attitudes of communities in which companies are located, stories in the media, investor pressure, and positive incentives like the 33/50 program. However the ways in which participating firms differ from nonparticipating firms are not well understood.

Arora and Cason (1994, 1995) noted substantial variation in

willingness to participate among different industries and EPA regions. Among industries, the variation might be explained by levels of advertising as well as research-and-development expenditures, the strength and environmental commitment of trade and manufacturer associations, and each industry's market structure. Firms with numerous competitors were found to be more likely to participate than those without competitors. Arora and Cason speculated that recent trends in green marketing and in consumer awareness of environmental issues might be a reason for this. Among EPA regions, the authors speculated that the variation might be due to differences in the regions' environmental regulations or different levels of effectiveness of EPA regional coordinators in recruiting firms to join the program.

In a survey conducted by the Manufacturers Alliance in 1994, the reason most frequently given for participating in the 33/50 program was to demonstrate support for voluntary reduction programs as alternatives to mandatory requirements. Participants also recognized the potential to save money by reducing materials loss and waste-handling costs.

NEXT STEPS

Although it is difficult to evaluate the effectiveness of efforts that seek to promote industry-initiated environmental activities, the committee believes that such programs have value and should continue. Based upon its investigations, deliberations, and collective experience, the committee suggests next steps that government agencies and other organizations should consider to firmly establish approaches for promoting industrial initiatives. Such steps would help broaden the development and evaluation of industry-initiated efforts.

Government agencies and other organizations should strive to develop and improve methods for evaluating the environmental effectiveness of industry-initiated approaches. Success of various programs remains largely speculative, and claims of industry successes often are met with skepticism. Methods for evaluating programs should provide a basis for agreement as to what is successful. By defining measurable goals and developing definitive and objective methods or a common set of principles, industry-initiated environmental programs could be encouraged further. A system for public reporting of environmental performance data by industry would provide all the stakeholders with information sufficient to allow conclusions to be drawn on the overall effectiveness of an activity or program. Such a system would need to take into account concerns about disclosure of confidential business information.

In developing criteria for evaluations of industry-initiated efforts not involved with regulatory compliance, total net reductions of environmental waste or releases should not necessarily be considered paramount, because those can be greater for larger companies and for companies that have not previously operated efficiently. Rather, evaluation methods might include measures of efficiency, such as waste per unit of product.

Different types of programs need different criteria for evaluation, because no one criterion can accommodate the broad diversity of programs and types of industrial activities. An overall environmental management program needs a different form of evaluation than a program that focuses on specific industrial activities. In addition, industries, and sometimes manufacturing processes within an industry, have different environmental issues to contend with and each type should be evaluated with respect to the relevant issues.

Government agencies should strive to make regulatory compliance strategies more flexible and adaptable to opportunities for improvement. Many U.S. companies have initiated environmental-protection programs suited for a particular industry or facility. A common sentiment among industry is that environmental regulations should be flexible enough to permit and encourage such programs by moving towards performance-based regulations which specify performance standards without mandating the means of compliance. New environmental regulations also need to protect the gains made by ongoing projects from being undone. Industry initiatives could be encouraged and sustained by a flexible performance-based regulatory structure that took more fully into account the ability of corporate management to comply with regulations in ways that are effective and efficient for their particular enterprise.

OTHER CONSIDERATIONS FOR PROMOTING INDUSTRIAL INITIATIVES

The committee is aware that efforts to recognize innovative programs, supply technical assistance, and disseminate information appear to be successful in some instances. Government agencies and other organizations are encouraged to explore innovative ways of using such techniques to promote industrial initiatives. Public awareness and public image are an important part of the motivation for companies to establish effective environmental programs. Organized and respected forums for recognition can encourage efforts in this area by providing recognition in the form of awards or publicity for innovative programs to improve environmental quality. This approach requires some framework for evaluation and selection by independent panels.

Especially for small manufacturers and businesses, the costs of environmental improvements might be barriers to initiating a program. If technical assistance were available, the time and costs of researching options and developing a program would be lessened, and more small companies might initiate programs.

If one company has developed an effective environmental management strategy, has overcome barriers, or has developed innovative technology, that information could be useful to other companies. Collection and dissemination of such information by government agencies and other organizations could encourage and assist other companies interested in improving their environmental performance. Conferences, other types of meetings, and electronic communications should be used regularly to disseminate such information and to encourage and assist other companies interested in improving their environmental performance. Those disseminating the information should be aware that some companies might be resistant to changing approaches, particularly those that were developed and tested within their own organizations.

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Appendices

Appendix A

Descriptions of Industry-Initiated Environmental Programs

This appendix provides additional information about the industry environmental programs listed in Table 2. 1. Information was provided by companies in response to requests from the committee. Companies were asked to describe briefly their environmental programs, including difficulties faced in implementing their programs and how they determine whether a program is successful. The program descriptions are intended to illustrate a range of approaches and perspectives relevant to industry-initiated environmental efforts.

3M: POLLUTION PREVENTION PAYS PROGRAM

The 3M Corporation's Pollution Prevention Pays (3P) Program is reported to be the longest running continuous industry-initiated program in the United States. For each of its 4,100 pollution-prevention projects, 3M measures "success" in terms of the pollution prevention results for a given year compared with those of the first project year. 3M estimates that between 1975 and 1994, the program has prevented 159,000 tons of air pollutants, 29,000 tons of water pollutants, 439,000 tons of sludge or solid waste, and 2 billion gallons of wastewater in the United States.

3M states that an important part of succeeding with the program and overcoming barriers has been a strong commitment from top

management that incorporates pollution prevention objectives into the company's operations. 3M believes the program helps to develop technically sound, cost-effective approaches to environmental management and also enhances a strong environmental culture throughout the company.

DOW: WASTE REDUCTION ALWAYS PAYS

The Dow Chemical Company's Waste Reduction Always Pays (WRAP) program was formalized in 1986 with two key components: (1) financial support for projects that reduce waste or emissions and (2) recognition for successful projects and the individuals involved in those projects. The program reportedly was designed to stimulate a cultural shift in thinking of Dow employees concerning the value of reducing waste releases and emissions reduction. The goals of the program are to reduce waste to the environment, recognize achievement, enhance waste reduction awareness, measure and track progress, and reduce long-term costs.

A team composed of facility-level waste reduction personnel and regional environmental managers select approximately 20 different projects annually from around the United States. The factors by which the projects are judged include: type of compound, amount of reduction, environmental media in which pollution will be reduced, cost effectiveness, actual dollar savings, and how the project was identified.

Dow measures environmental success in two general ways. First, it evaluates how well the concepts of waste reduction are becoming part of company culture. This is assessed by evaluating participation in the WRAP program directly and by evaluating responses to related questions that are asked as part of self-evaluation surveys used to verify implementation of pollution-

prevention practices. Second, annual environmental release data reported to EPA's Toxics Release Inventory are used to measure environmental success. Because it is done on a project-by-project basis, WRAP is simpler and probably easier to emulate than programs aimed at coordinating waste-reduction efforts across an entire company.

LUCENT TECHNOLOGIES: STREAMLINED LIFE-CYCLE ASSESSMENT

Lucent Technologies (formerly part of AT&T) states that it has a corporate goal to manufacture environmentally responsible telecommunications products and that the product design process should consider all product life stages and all environmental interactions. A full life-cycle assessment is not traditionally performed by product design and manufacturing engineers; that could be too expensive and time-consuming. However, an Lucent scientist and an environmental affairs manager worked together to develop a qualitative, streamlined life-cycle analysis technique. Lucent estimates that the use of this technique can identify perhaps 80% of the useful actions that could be taken in designing products with an objective for reducing environmental effects (Graedel et al., 1995). Because the amounts of time and money are much smaller for its streamlined analysis than for a comprehensive life-cycle assessment, Lucent believes any particular assessment has a better chance of being carried out, the recommendations have a better chance of being implemented, and more assessments can be undertaken.

Lucent's principal indicator for environmental success is whether, as a result of streamlined life-cycle assessments, product designers make environmentally preferable choices that would otherwise not

have been made. In the long term, Lucent expects that by using this approach each new product will be environmentally superior to the product it replaces. For the future, Lucent plans to apply these techniques to processes and facilities as well as products. Lucent believes that designing products to lessen environmental impacts will contribute to pollution prevention, waste reduction, and energy efficiency.

Internal barriers to success have included the lack of technical personnel trained in streamlined life-cycle assessment. The technique has been freely shared by Lucent, and versions of it are being used by other corporations.

FORD: MANUFACTURING ENVIRONMENTAL LEADERSHIP PROGRAM

The stated intent of Ford's Manufacturing Environmental Leadership Program is to prevent pollution at the early stages of process and product development, to reduce or eliminate the use of materials of concern, to promote and plan for recyclability, to meet or exceed all environmental regulatory requirements, to protect and enhance wildlife habitats at or near company facilities, and to obtain supplier support and involvement in the program.

Metrics for environmental success are established as specific strategies are developed. For example, a strategy to replace materials used for packaging is considered successful if the use of new materials results in generating less waste without reducing product quality. One barrier to success of the program is the difficulty of communicating in a large organization. Environmental leadership, and full commitment from top management is critical for the success of the activity.

CORNING INCORPORATED: MATERIALS SUBSTITUTION AND PROCESS MODIFICATION

Corning Inc. began as a glass manufacturer and remains so today, although its range of products and services has broadened to include ceramics, plastics, and clinical and pharmaceutical testing. The stated goals of Coming's environmental program are to reduce waste and pollution from core manufacturing processes while maintaining or improving product quality. These goals are pursued through materials substitution and by process modification.

Corning has been working to find substitutes for materials such as arsenic and lead and to develop and take advantage of new technologies such as gas/oxy firing, which provides heat to process tanks by combustion of a fuel consisting of natural gas and pure oxygen. This technique results in a substantial reduction in the production of oxides of nitrogen. Arsenic has been used by Coming and other manufacturers for many years to remove impurities from glass. Coming is voluntarily phasing out arsenic from its glass products, but a major development effort is required to remove arsenic from each type of glass while maintaining product quality. Coming also has mounted a substantial research effort to develop new glass compositions that reduce or eliminate lead and barium in several types of glasses while maintaining the desirable properties those elements bestow on glasses. In addition, a program is underway to eliminate chlorides from raw materials fed into some of Coming's facilities. This will greatly reduce hydrogen chloride emissions from those processes. An external barrier to such changes—lack of customer acceptance of the product—is being addressed by plant and business representatives.

The metric for environmental success is the reduction in use and emissions of materials of concern. Overall, Corning's

environmental releases of chemicals that were reported to EPA's Toxics Release Inventory dropped by 66% between 1988 and 1993, although this is due in part to the 1989 exclusion of aluminum oxide from EPA's list of reportable emissions.

JAMESTOWN PAINT COMPANY: POLLUTION PREVENTION PROGRAM

Jamestown Paint Company, founded in 1885 in Jamestown, Pennsylvania, is a family-owned, regional manufacturer of industrial and speciality coatings. Since 1990, the company has recycled office paper, glass, aluminum, and cardboard, using traditional waste-control methods. The company also has developed a comprehensive program to reduce hazardous waste generation; reuse, recycle, and recover materials; and increase efficiencies, customer satisfaction, and profits. To do this, Jamestown took advantage of technical services offered to manufacturers by the state of Pennsylvania to analyze their waste streams and the processes that generate waste. Jamestown Paint then conducted further assessments, including: (1) a study to determine how pollution prevention might affect product quality, (2) a cost-of-quality study focusing on the production steps that generate waste, (3) customer surveys regarding product quality, and (4) an overall quality-control system assessment. Based on those assessments, the company developed a plan for improving product quality and cutting costs through pollution prevention.

The two most important challenges that Jamestown Paint had to meet were active employee participation and total commitment from management throughout the company. The company plans to continue to work on these challenges using additional training and by highlighting examples set by managers.

CERDEC CORPORATION/DRAKENFELD PRODUCTS: REDUCING POLLUTION AND WORKER EXPOSURE

Cerdec Corporation/Drakenfeld Products manufactures coatings and pigments for glass, ceramic, and plastic products. Given the use of mixed metal oxides containing inorganic metals in its processing, Cerdec/Drakenfeld focuses its environmental efforts primarily on solid wastes and worker safety and health improvements, such as reducing employee blood lead levels. By 1992, the company reported that it had voluntarily reduced the combined amount of various toxics by 43% and had reduced the level of its hazardous waste by 55% through waste management and minimization while increasing product output by 40%. From 1982–1993, the company stated that it reduced accident frequency by 84% and the accident severity rate by 76%; in addition, the company has reported reduction of lead in air at process centers by 85% from 1982–1992 and decreased blood lead levels of employees by 70% from 1981–1993.

Cerdec/Drakenfeld reports that it has successfully exported its environmental efforts to European member companies; for example, the Frankfurt plant reportedly duplicated the lead reduction program developed in Washington, Pennsylvania. Cerdec/Drakenfeld formed its first public advisory council in 1991 with representation from various sectors of the community.

Appendix B

Descriptions of Programs to Promote Industry-Initiated Efforts

The following efforts are included: environmental management standards, environmental product certification, industrial consortia, partnerships between industry and other organizations, and nonregulatory federal programs. Information was provided by organizations in response to requests from the committee.

ENVIRONMENTAL MANAGEMENT STANDARDS

Environmental management has become increasingly influenced by nonregulatory international standards, and the Europeans have taken an important leadership role in facilitating the process. The United States, with its past reliance on traditional approaches to environmental regulation, only recently began to assume a strong role in international, consensus-based, environmental management standards as mentioned below. Several efforts underway appear to offer the prospect of advancing corporate environmental performance, well ahead of any regulatory requirements. The efforts dovetail to an increasing extent with domestic "beyond compliance" proposals now being developed by the U.S. Environmental Protection Agency (EPA) as part of regulatory reform and by Congress as it debates a series of risk-management and regulatory-reform proposals. Examples of standards (or codes) of environmental management practice include the Chemical Manufacturers

Association's Responsible Care program, the Coalition for Environmentally Responsible Economies (CERES) principles, the International Chamber of Commerce's Business Charter for Sustainable Development, and the International Organization for Standardization (ISO). Nash and Ehrenfeld (1996) report that such standards differ from government regulations in that they attempt to foster long-term changes in the ways companies think about the environment and how they integrate environmental aims with other business objectives. In contrast, the main purpose of government regulation has been to protect humans and the environment.

The ISO 14000 series of environmental management documents is perhaps the most promising of the current international efforts now under the auspices of the ISO, an international body that has developed international consensus standards for business in a wide variety of fields since 1951. More than 400 U.S. industries have participated in the development of ISO 14000. And like other ISO standards, ISO 14000 applies across a range of organizations and geographic locations, a feature that helps ensure common attributes throughout corporate management structures.

The ISO 14000 standards focus on tools for environmental management and planning, not performance or setting of environmental release levels. They are intended to help companies manage their organizations better within their own limitations, demonstrate their commitment to pollution prevention, and ensure that laws, regulations, and other goals are met. To become registered as an ISO 14000 entity, an organization needs to demonstrate to an independent, external registrar that

- It has implemented all the elements of the Environmental Management Standards developed under the auspices of ISO
- It has an effective system for maintaining its compliance to applicable laws and regulations

- Its management practices promote continual improvement of its systems for environmental protection

Advocates of international environmental-management standards expect enormous benefits. Such standards, they say, have the potential to change the culture of companies worldwide on environmental protection and commitment; harmonize environmental management frameworks, labels, and methods worldwide; move companies beyond compliance; and promote voluntary improvements. However, like most environmental-management standards, ISO 14000 stops short of requirements for reporting or performance.

Companies may choose to become certified under an environmental-management standard for a number of reasons. They may become certified as a result of outside influences such as the need to retain customers and market shares or the desire to cultivate a positive public image. Alternatively, companies may become interested in standards because of internal influences, such as a desire to operate in a manner that is protective of the environment or the desire for a well-managed, efficiently run company. Finally, companies might be interested in certification out of perceived long-term interest. Investment in proper environmental-management techniques today might save future regulatory compliance costs or clean-up costs, make them less vulnerable to changing regulations, or ensure competitiveness.

ENVIRONMENTAL PRODUCT CERTIFICATION (LABELLING)

Environmental product-certification programs usually are performed by independent organizations and adopted voluntarily by

manufacturers. The U.S. government does not support or endorse any labelling programs by independent organizations, although some foreign countries provide significant support to and endorsement of seal-of-approval type programs.

Types of Labelling Programs

There are a number of different types of labelling programs, including seals of approval, single-attribute certification programs, and report cards. Seals of approval are generally intended to identify products or services as meeting certain criteria and minimum standards for environmental effects. These types of programs award the use of a logo to products meeting criteria for a particular product category. Single-attribute certification programs usually indicate that an independent organization has validated a particular claim made by the manufacturer. Typically, the claim is validated by means of a review of information supplied by the manufacturer plus analysis of other relevant independent data. Finally, report cards offer consumers neutral information about a product or a company's environmental performance in multiple categories. In this type of labelling program, various environmental attributes are categorized, quantified, and listed on the product label.

Criteria for Evaluating Labelling Programs

Labelling programs can be evaluated according to the level of consumer awareness and acceptance that they generate. Surveys documenting percentages of customers who understand labelling programs and consider labels in their purchasing decisions can be

used for these evaluations. In addition, labelling programs can be evaluated by examining consumer behavior. Changes in the market share of a labelled product might indicate whether the labelling program has had an effect. Manufacturer use of labelling can be evaluated; for example, the percentage of manufacturers in a product category that participate in labelling might be an indication of the effects of a program. Another factor in evaluating the effectiveness of a labelling program is the environmental benefit generated. That type of effect is difficult to quantify, however.

Barriers to Adoption/Implementation

Barriers to the adoption of labelling programs include expense of data development, lack of consensus on validity of the data, and lack of acceptance by small manufacturers. Other barriers that might deter labeling are low consumer understanding of a label's significance and lack of resources to educate consumers, lack of a uniform approach to environmental labelling, reluctance of manufacturers to disclose proprietary information needed for certification, and difficulty in demonstrating economic or environmental benefits.

INDUSTRIAL CONSORTIA

Companies are collaborating in several ways to share environmental management experiences and to develop proactive ways of addressing environmental problems. They have formed consortia that deal with environmental issues, directly and indirectly. These consortia are often based on underlying common interests such as

a similar type of manufacturing, specific pollutant, or a particular environmental strategy.

This section discusses two industry consortia: the Global Environmental Management Initiative (GEMI) and Semiconductor Manufacturing Technology (SEMATECH). These two consortia are known for their substantial membership and reported achievement. Each represents a different type of consortium. SEMATECH represents a domestic consortium organized around a particular industry, the semiconductor industry. GEMI represents a consortium with broader membership in industry sectors and international participation.

Assessments by industry representatives regarding the benefits of membership in consortia such as GEMI and SEMATECH have common themes. They say it is impossible to evaluate effectiveness of these programs in terms of pollution prevention or energy efficiency. However, it is possible to speculate that the programs had an effect of stimulating environmental initiatives through increased member awareness of improved environmental technologies and management strategies.

The surveyed companies stated common reasons for joining GEMI, including (1) to share environmental-management experience with other companies; (2) to develop environmental-management information and to influence the use of environmental-management tools through participation; (3) to access a broad range of companies from different industry sectors; (4) to obtain greater proficiency in mid- and high-level environmental management; (5) to develop measurement tools for environmental performance; (6) to examine models for assessment of economic benefits associated with environmental management and performance; (7) to anticipate future environmental requirements and developing programs to respond to them positively; and (8) to produce environmental reports that are designed to attract investors.

Members of SEMATECH reported they had joined to ensure and improve the competitiveness of their own manufacturing processes as well as those of US industry. In addition, however, members listed environmental benefits derived from SEMATECH: (1) networking, working as a team, leveraging on environmental issues; (2) being proactive instead of reactive on environmental goals; (3) information sharing on issues such as emissions control equipment or chemical-risk assessment tools; and (4) working toward new process design standards.

PARTNERSHIPS BETWEEN INDUSTRY AND OTHER ORGANIZATIONS

Many innovative partnerships are being developed between and among industry, environmental organizations, government agencies, and community organizations. Three partnerships that represent a variety of alliances being forged are discussed below. They include a partnership between a large corporation and a national environmental organization, a partnership between several automakers and state and federal government agencies, and a series of agreements between facilities and communities.

EDF/McDonald's Waste Reduction Task Force

In 1991, the Environmental Defense Fund (EDF) and McDonald's Corporation set up the Waste Reduction Task Force with the goal of developing a solid-waste management plan for McDonald's. The goals of the Waste Reduction Task Force were (1) develop a new waste-reduction policy for McDonald's; (2) create a new

waste-reduction action plan outlining 42 different actions; and (3) change management mechanisms to institutionalize waste reduction into McDonald's decision-making processes. Waste-reduction packaging specifications, for example, were added to existing specifications of cost, functionality, and availability. These new specifications were sent to more than 600 suppliers of McDonald's.

The partnership measured environmental success by achieving consensus goals for the effort and by implementing an action plan. McDonald's reports that programs and actions resulting from the partnership include the McRecycle USA program, institutionalizing of environmental values throughout the system, education programs on rain forest conservation and solid waste, and tree planting and recycling efforts with local communities.

Barriers to success for this project were primarily lack of infrastructure, such as source-separated composting facilities. Consensus on initiatives had to be developed within the company; that barrier was overcome through the efforts of task-force members from McDonald's, who served as internal advocates for the project.

The project is exportable. One of the goals of the project is to serve as a model for other companies. Other companies, such as Burger King and Hardees, have undertaken similar initiatives. A final public report provides extensive details and offers a guide to actions taken.

Automotive Pollution Prevention Project

In September 1991, the American Automobile Manufacturers Association (AAMA) (on behalf of Chrysler Corporation, Ford Motor Company, and General Motors Corporation) and the Michigan Department of Natural Resources (MDNR) (on behalf of the eight Great Lakes states and the U.S. EPA), agreed to a

pollution-prevention action plan to reduce the generation and release of persistent toxic substances in the Great Lakes basin. The agreement, known as the Automotive Pollution Prevention Project had the following goals: (1) identify Great Lakes persistent toxic (GLPT) substances and reduce their generation and release; (2) advance pollution prevention within the auto industry and its supplier base; (3) reduce releases of GLPT substances beyond regulatory requirements; and (4) address regulatory barriers that inhibit pollution-prevention activities.

The results are claimed to represent benefits to the environment beyond any regulatory requirements. Releases of the listed GLPT substances by the auto companies were cut more than 20% in the first year of the project. When adjusted for production volumes, releases of auto project toxics reportedly were lowered by about 29%. The reductions were accomplished through the use of controls and treatment processes and pollution-prevention actions. The project is considered by some to be an example of how a flexible and cooperative environmental initiative by government and industry can achieve and reconcile mutual environmental and economic objectives.

Good Neighbor Project for Sustainable Industries

"Good neighbor" agreements have become increasingly used as a means of forming partnerships between industrial facilities and local communities. The Good Neighbor Project for Sustainable Industries provides legal, technical, and strategic assistance to secure rights and resources for effective participation by community groups. The project developed eight principles of sustainable industry partnerships:

- Bring all the players to the sustainable industry negotiating table.
- Strengthen the sustainability of existing industrial operations.
- Take stock of unique local or regional characteristics to create and maintain a sustainable attraction for industries.
- Target environmentally sound industries that can tap growing global markets.
- Cultivate local sustainable industry clusters.
- Reinforce long-term commitments of industries.
- Address transitional issues for labor, land, and capital.
- Establish meta-policies: action beyond local communities.

Through Good Neighbor agreements, firms have made environmental and health funding commitments, such as increased donations to local causes, paid for community-controlled health clinics in contaminated areas, conducted plant inspections and additional air- and water-pollution monitoring, disclosed company environmental documents in a public file, and conducted job training and recruitment in neighborhoods.

An example of a Good Neighbor agreement is provided by actions taken in Faribault, Minnesota. Crown Cork & Seal went through a community, labor, and management negotiation process that resulted in the establishment of pollution-prevention measures at the facility. The citizens groups provided a technical adviser to assist in evaluating opportunities for pollution prevention. The company voluntarily disclosed information to the community regarding pollution-prevention technologies and opportunities.

NONREGULATORY FEDERAL PROGRAMS

Industry can participate in many federal and state programs devoted to environmental objectives, such as pollution prevention, waste reduction, or energy efficiency. This section addresses some of the most well-known programs of this type and those that have the largest scope.

Department of Energy

The Department of Energy (DOE) has undertaken several initiatives. Part of the mission of the DOE Office of Industrial Technology (OIT) is to increase energy-use efficiency, enhance fuel flexibility, develop alternative energy sources, minimize waste, improve environmental quality, increase productivity, and create jobs. Key elements to accomplish those goals include cooperative and interdependent actions, such as partnerships, alliances, and teams between industry and government. OIT also emphasizes the importance of industry and government sharing values and implementing joint voluntary actions. OIT seeks partnerships that are not restricted to a single regulatory agency or a single industry, but cross-cutting partnerships among industries and multiple federal agencies, such as the Department of Commerce, EPA, the Department of Defense, and the National Science Foundation. OIT's approach includes promoting the development of advanced technology.

Among the participants in collaborative efforts under way with DOE are

- Energy supply—Advanced turbine system: the Electric Power Research Institute, the Gas Research Institute, and a consortium of gas turbine manufacturers and utilities.

- Process efficiency—Advanced process control: Bethlehem Steel, Westinghouse, U.S. Steel, North American Refractories, the National Institute of Science and Technology, LTV Steel, the Jet Propulsion Laboratory, Data Measurement Corporation, Inland Steel, Oak Ridge National Laboratories, and National Steel.
- Waste reduction—Carpet waste recycling: Allied Signal, Aristech, Plenco, and Interchem.

DOE also sponsors voluntary programs such as

Climate Challenge: A program with electrical utilities to return greenhouse gas emissions to 1990 levels by 2000.

Climate Wise: With EPA, a program to provide performance-based recognition for emissions reduction measures.

Coalbed Methane Outreach: A joint EPA and DOE program to look at cost-effective reduction in emissions.

Cool Communities: Community partnerships on strategic tree planting to decrease energy demand.

Energy Efficiency and Renewable Energy Information and Training Programs: Information for facility managers, architects, engineers, designers, builders, code officials and the financial community with goals of energy efficiency and cost savings.

Golden Carrot Programs: With EPA, financial incentives to commercialize advanced energy-efficient technologies (e.g., pooled rebates across utilities to guarantee rebates).

Motor Challenge: To verify and disseminate information on cost-savings potential of efficient industrial motors.

NICE^3: Joint with EPA to diffuse existing technologies to address pollution prevention and energy efficiency when new equipment is installed.

EPA's 33/50 Program

The 33/50 program is an EPA-sponsored pollution reduction initiative that derives its name from its overall goals of reducing environmental releases and off-site transfers of 17 high-priority toxic chemicals by 33% by 1992 and 50% by 1995. The bench-mark against which the initiative is measured is the 1988 Toxics Release Inventory (TRI) baseline of 1.5 billion pounds of pollutants. More than 1,200 US manufacturers are participating in the program.

To participate, each company needed only to write a letter to EPA containing numerical reduction commitments. Participating companies could choose to reduce releases for all or some of the 33/50 chemicals and could select which of their facilities, if they have more than one, would participate in the program. In addition, participants could choose which environmental media to focus on (air, land, or water), although about 70% of the releases of 33/50 chemicals are into the air. Participation in the program did not change a firm's responsibilities for complying with environmental laws. EPA states that it does not give preferential treatment, relaxed regulatory oversight, or relaxed enforcement of EPA regulations to program participants. Commitments to achieve pollution reductions were voluntary and therefore not legally enforceable. EPA asked that participants attain these goals primarily by source reduction and recycling techniques.

EPA reported that the program's goal of a 33% overall reduction in releases of the 33/50 chemicals by 1992 was surpassed by more than 100 million pounds. It is estimated that the 1995 goals also were achieved ahead of schedule.

Green Lights

The U.S. EPA's Green Lights program was officially launched in 1991. The goal of the program is to prevent pollution by encouraging major U.S. institutions to use energy-efficient lighting. Lighting consumes about 25% of the electricity used nationwide, and much of that lighting is provided inefficiently. The Green Lights program offers an opportunity to increase the efficiency of lighting, prevent pollution from electricity generation, and reduce costs simultaneously. Lighting upgrades reduce electric bills and maintenance costs and increase lighting quality. Typically, investments in energy-efficient lighting are estimated to yield 20–30% rates of return per year.

In the Green Lights program, institutions are asked to sign a memorandum of understanding with EPA. In that memorandum, the institution commits to install energy-efficient lighting in 90% of its space nationwide over 5 years when it is profitable and where lighting quality is maintained or improved. EPA, in turn, offers program participants a portfolio of technical support services to assist them in upgrading their buildings.

A computerized decision support system developed by EPA provides Green Lights participants with a rapid way of surveying the lighting systems in their facilities, assessing their retrofit options, and selecting the best energy-efficient lighting upgrades. The decision support system software produces reports suitable for use by facility managers, financial staff, and senior management.

EPA has established a national lighting product information program in conjunction with utilities and other organizations. This program provides brand name information so that purchasers will be able to choose appropriate products. In addition, it allows innovative products to be qualified rapidly, removing a significant barrier for new technologies.

EPA also helps Green Lights partners identify financing resources for improvements. Green Lights partners receive a computerized directory of financing and incentive programs offered by electric utilities, lighting-management companies, banks, and financing companies. The database is updated and distributed on a regular basis.

Energy Star

Energy Star began in June 1992 as a program for manufacturers of computer monitors and printers. The program is a joint EPA and Department of Energy (DOE) initiative that encourages the use of efficient technologies to reduce energy use in commercial buildings. The first Energy Star awards recently were awarded to companies that made outstanding efforts in manufacturing energy-efficient computers, monitors, and printers. EPA announced results in a recent report indicating that more than 40% of personal computers and 85% of printers sold in the United States from July 1993 to June 1994 were meeting Energy Star requirements. A new category for fax machines was launched in July 1995.

WasteWi$e

WasteWi$e is a EPA program that focuses on ways that companies can save money through municipal solid-waste reductions. Avoiding waste generation reduces the burden on disposal facilities, conserves natural resources, and often reduces pollution. The program seeks to reduce the amount of material disposed in dumpsters; it does not include hazardous waste, industrial solid waste, or materials recycled in manufacturing processes.

To participate in WasteWi$e, companies commit to achieving reduction goals in three areas: (1) reducing waste generation, such as office paper, food scraps, packaging, corrugated cardboard and wood pallets; (2) collecting recyclables that might otherwise end up in a landfill; and (3) buying or manufacturing products with recycled content.

EPA provides technical assistance via a hotline and electronic bulletin board, publications, and regular program updates. Successful waste-reduction efforts are highlighted in EPA documents, business magazines, environmental journals, and trade publications. Companies involved may use the WasteWi$e logo in their advertising to highlight participation in environmental initiatives.

Climate-Wi$e

Climate-Wi$e is sponsored by EPA to stimulate greenhouse-gas reductions across all sectors of the economy. Under the President's Climate Change Action Plan, Climate-Wi$e participants are challenged to find creative ways to limit, reduce, or mitigate greenhouse gases. Strategies include process changes, raw-material substitutions, carbon sequestration, and other emission-reduction actions.

Design for the Environment

EPA's Design for the Environment (DfE) program is intended to promote pollution prevention, energy efficiency, and resource conservation through partnerships with specific industry sectors and professional and academic groups. DfE encourages businesses

to incorporate environmental considerations early into the design of products, processes, and technical-management systems. DfF's industry cooperative projects include dry-cleaning, printing, and computer-workstation companies. "Cleaner technology substitutes assessments" (CTSAs) are designed to help companies sort cost and performance profiles of new ways to do business.

REGULATORY FEDERAL PROGRAMS

Several federal programs have been developed with the intent to provide more flexible approaches so that industry might comply with existing regulations in a more cost-effective way. Two such programs are discussed in this section.

Common Sense Initiative

Begun in 1993, EPA's Common Sense Initiative is intended to be a holistic version of environmental policy as compared with the traditional pollutant-by-pollutant approach for specific environmental media. Approximately 40 projects are under way in six industry sectors: automobile manufacturing, computers and electronics, iron and steel, metal finishing, petroleum refining, and printing. Projects are conducted by groups made up of representatives from industry; environmental organizations; environmental justice and community organizations; labor; and federal, state, and local governments. The teams are attempting to develop consensus-based alternatives to traditional approaches to environmental protection.

The projects include efforts to reduce duplicative reporting requirements, streamline the permits process, improve community

involvement in environmental decision-making, find incentives for and eliminate barriers to pollution prevention.

Project XL

Project XL (excellence and leadership) was begun in 1995 through a presidential initiative to develop innovative strategies intended to achieve more effective and less expensive results than traditional regulatory approaches. EPA is conducting the experimental program to seek projects that result in innovative strategies that can involve processes, technologies, or management practices. Each project involves the granting of regulatory flexibility by EPA in exchange for an enforceable commitment by a regulated entity to achieve superior environmental benefits than would have been attained through full compliance with regulations. EPA is in the process of developing guidelines to resolve among other issues, what is meant by "superior environmental performance."

A company wanting to participate in the project must first submit a proposal to EPA that contains the idea for how a facility will be able to reduce its regulatory burden while also reducing its pollution below regulatory or permit levels. After EPA approves the plan, the company begins negotiations with all affected stakeholders, including EPA, state and local environmental agencies, and community organizations.

EPA reports that about 14 facilities are in the process of negotiating a final agreement between EPA and the company or community (Chemical and Engineering News 1996).