
Chapter 2

Policy Options

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THE EXISTING FEDERAL EFFORT

Waste Minimization Under RCRA

The 1984 waste minimization amendments to the Resource Conservation and Recovery Act (RCRA) deal explicitly with waste reduction. In addition to their significance as the first major congressional policy statement on waste reduction, they have had some notable positive effects. Congress did not direct industry to carry out waste reduction. It requires that companies report what they are currently doing and what they are planning to do towards that goal. The result has been a more effective *voluntary* program than previously existed, with government requirements purposely kept unintrusive. Although Congress has imposed only minimal self-reporting and self-enforcing regulatory requirements, the amendments have unquestionably given more importance and visibility to waste reduction,

Some opportunities to achieve environmental protection through waste reduction were created within earlier environmental statutes, such as the Clean Water Act and the Clean Air Act, but the end-of-pipe pollution control approach became dominant. This history suggests that attempts to foster waste reduction as part of existing pollution control programs might not be effective (see ch. 5).

About 40 percent of companies surveyed by OTA (see app. A) say that they have initiated new waste reduction programs as a result of the 1984 legislation. Others appear to have a wait-and-see attitude. There is some reluctance on the part of industry to provide detailed data on their waste reduction efforts, even among those that publicize their successes. It is commonly believed that certain types of detailed information might be used in some way by government to set required amounts of waste reduction. Also, because of concerns about competitors, many companies keep some infor-

mation confidential, particularly about their processes.¹

A summary of the problems with the RCRA amendments that deal with waste minimization and waste reduction, the statute and regulations and their implementation by the Environmental Protection Agency (EPA) and the States, is given in table 1-1 in chapter 1. Compared to other aspects of the RCRA 1984 amendments, waste reduction has received relatively low priority. There is very little guidance to industry in the RCRA amendments as to what is the most desirable type of waste reduction, in terms of environmental benefits, and there is no provision for governmental assistance. Moreover, it is generally believed that the RCRA requirements apply narrowly to hazardous solid wastes as defined by RCRA and not to the full range of hazardous substances and pollutants that are currently unregulated or that are regulated by other environmental statutes and programs. On the basis of EPA actions to date, there is little reason to believe any other interpretation has been made.

A common misconception is that the solid, hazardous wastes covered by RCRA—roughly 250 million tons of these are generated annually²—represent most industrial hazardous

¹For example, in a recent public at ion on environmental auditing (funded by EPA) the following appears: "... the auditor needs to be careful in how the information collected is recorded to avoid revealing information on production and manufacturing processes." [The Environmental Law Institute, "An Introduction to Environmental Auditing," 1985.] Although there is increasing interest in audits for waste reduction, it must be emphasized that most current auditing is aimed at regulatory compliance and that people doing this job may not be qualified to examine production operations for waste reduction purposes.

²This figure for RCRA waste is widely used because EPA, OTA, and the Congressional Budget Office have obtained it through different techniques: however, a survey of about 50 percent of the Chemical Manufacturers Association's member chemical companies for 1984 indicated that 278.5 million tons of hazardous waste were generated by them alone, [Chemical Manufacturers Association, "Results of the 1984 CMA Hazardous Waste Survey," January 1986.]

waste. One attempt by EPA to summarize emissions of air toxics nationwide resulted in an admittedly uncertain total of over 4 million tons annually for 86 chemicals;³ another EPA study estimated emissions of volatile organic compounds to be 19 million tons annually.⁴ A recent study on waste reduction in the chemical industry found that:

Despite the common assumption that solid waste generation far exceeds discharges to air and water, hazardous chemical wastes were found to be generated in roughly equal amounts as air emissions, wastewater discharges, and as solid wastes. s

Taking into account the lack of certainty of the RCRA data and rough attempts by EPA to calculate other wastes, it is still fair to estimate that for every person in the Nation well over a ton of hazardous waste is being generated annually.

While quantities by themselves do not determine environmental risk, they do indicate that there is a significant potential for problems, depending on local exposure conditions. In some cases there may be danger of global problems related to atmospheric effects. Moreover, a national waste reduction program that does not deal with cutting down on pollutants specified under the Clean Air and Clean Water Acts would not be effective because some wastes might then be legally shifted to the air and the water.

Another characteristic of the RCRA statute and regulations is the ambiguous tension it sets up between waste reduction (prevention) and preferred waste management (control). The statute seems to give primacy to waste reduction in its policy statement, but a main focus of the RCRA 1984 amendments is on alternatives to land disposal, and later sections of the statute and subsequent regulations give emphasis to the use of waste treatment. The desired

shift away from land disposal may take place within the framework of pollution control, specifically waste treatment, unless waste reduction is unambiguously given primacy over treatment and also given a clear definition that is consistent with this primacy. As noted earlier, this is not meant to imply that this report deems waste treatment undesirable. The issue is whether the statute's intent is to require that waste reduction be examined fully prior to choosing waste treatment,

The statutory and regulatory term *waste minimization* can be misinterpreted and confused with waste reduction. It is a term that is more inclusive than *waste reduction* because it is often believed to give equal status to offsite recycling and waste treatment alternatives to land disposal. Are generators expected to reduce their RCRA hazardous waste, their wastes covered by other environmental programs, and their unregulated wastes? Unless Congress gives further attention to waste reduction's primacy and definition, the answer to these questions may be "where is it written?"—or, more succinctly—"no."

Other aspects of the 1984 amendments, particularly the limits they set on land disposal, can be viewed as adjuncts to the direct attempt made in the amendments to stimulate waste reduction; but it is too early to know how EPA will implement this intent. (Indeed, early signs are that EPA's approach is unlikely to be acceptable to Congress and environmental groups.) It is impossible even to guess what the quantitative impact of the amendments will be. Moreover, current Federal data collection systems will not be able to measure a waste reduction effect.

To sum up, the congressional attempt to deal directly with waste reduction has retained the voluntary approach and has had positive impacts by focusing more attention on waste reduction. However, no actions have yet been taken to give waste reduction the institutional support and visibility of pollution control programs. Since no information is being collected or evaluated on how the voluntary approach works, some effort is probably required for this purpose. Because of limited government re-

³Tom Lahre, Office of Air Quality Planning and Standards, U.S. Environmental Protection Agency, "Characterization of Available Nationwide Air Toxics Emissions Data," June 13, 1984.

⁴U. S. Environmental Protection Agency, Office of Air Quality Planning and Standards, "Control Techniques for Volatile Organic Compound Emissions From Stationary Sources," draft, July 1985.

⁵David J. Sarokin, et al., *Cutting Chemical Wastes* (New York: INFORM, 1985), p. 27.

quirements and the absence of information-gathering programs, the amount of comprehensive waste reduction at the plant level is uncertain and largely undocumented; nor is it clear that everything that is being done leads to environmental risk reduction. It is not possible to know whether examples and case studies of waste reduction are representative of industry practice. In other words, while there is some solid information on specific cases of waste reduction, there is no data on the *extent* of waste reduction nationwide. Companies surveyed by OTA believe publicized waste reduction efforts may be overstatements. The concern appears to be that reports of successes imply too much about the broad applicability of waste reduction. Poor and limited information fosters such skepticism.

Current EPA Plans

The Office of Solid Waste (OSW) at EPA is formulating a short-term (2 to 4 years) and a long-term (5 to 10 years) strategy.⁶ The planning document is highly critical of the RCRA program, but waste minimization appears only in the long-term strategy. EPA says: "Waste minimization represents the long-run solution to many of [our] current problems and should be a major component of our long-run strategy." No distinction is made between waste minimization and waste reduction. A recent fiscal year 1987 draft priority list for all of EPA's activities makes no explicit mention of waste minimization/reduction in any of the four priorities listed under hazardous waste.⁷

EPA's Office of Research and Development (ORD) has described hazardous waste/Superfund issues for research for its 1988 budget request.⁸ Waste minimization, or waste reduction, does not appear among the 14 areas identified. However, waste minimization does appear as one of six major areas in ORD's plans for its

alternative (to land disposal) technologies program. Waste minimization, defined to include recycling but not waste treatment, has the lowest level of funding in this program, showing a proposed increase from 2.5 percent (\$235,000) in fiscal year 1986 to a possible 4.1 percent (\$440,000) in fiscal year 1989.⁹

Recent comments by one of EPA's Regional Administrators are also significant. With regard to the problems that impede waste reduction—regulatory loopholes, availability of low cost waste disposal, sporadic regulatory oversight, and fragmented and incomplete information—he said,

... each one of them is being, or has been, addressed over the last two years by several Federal and State initiatives and, most notably, by the '84 amendments.

With regard to the need to take further action, he said:

I don't think there's any shortage of indirect incentives to reducing waste at the source ... there are direct regulations as well. The question seems to be whether these efforts will be enough. It's easy to see why more direct regulation of waste production seems an especially attractive option. The truth is we don't know if the current scenario of indirect regulation, including new components now in the works, will be enough to reduce waste output to acceptable levels. I honestly believe it will.¹

This view is shared by ORD:

Even without EPA regulations on waste minimization, there is considerable economic

⁶U. S. Environmental Protection Agency, office of Solid Waste, 'hazardous Waste Implementation Strategy,' draft, 1986.

⁷*Inside E.P.A. Weekly Report*, Dec. 6, 1985.

⁸U. S. Environmental Protection Agency, Office of Research and Development, memorandum from the Hazardous Waste/Superfund Research Committee (Meg Kelly and John Skinner) to Donald J. Ehreth and J. Winston Porter, Apr. 23, 1986.

⁹U. S. Environmental Protection Agency, Office of Research and Development, memorandum "Alternative Technology Review (Step 2)," from Alfred W. Lindsey to the Hazardous Waste Research Subcommittee (J. Denit and H. Quinn), June 16, 1986. EPA's Science Advisory Board, in reviewing this research plan, recommended that funding for waste minimization efforts be increased and *that ORD expand the program to include evaluations in the area of process changes and material substitutions* (i.e., waste reduction). The board said that "true waste minimization" should begin to reduce or eliminate the generation of hazardous wastes *in the first place* through such steps. [U.S. Environmental Protection Agency, Science Advisory Board, "Review of the Alternative Technologies Research Program," report of the Environmental Engineering Committee, July 1986. J]

¹⁰Christopher J. Daggett, speech given at *Waste Reduction: How To Make It Happen* symposium, New Jersey Institute of Technology, Mar. 12, 1986.

incentive for industry to minimize, reuse, or recycle hazardous wastes .¹¹

At roughly the same time, however, the Office of Solid Waste, which implements RCRA, said:

... the current regulatory structure is complex and does not provide sufficient incentives for better waste management.¹²

If there are insufficient incentives for better waste management, there are certainly insufficient incentives for waste reduction.

Even after the recent reorganization of OSW, waste minimization/reduction was given no significant status within EPA's organization, al-

¹¹U.S. Environmental Protection Agency, memorandum, "Alternative Technology Review (Step 2)," *op. cit.*

¹²Gary M. Katz, Director, Management and Organization Division, U.S. Environmental Protection Agency, memorandum on "Reorganization of the Office of Solid Waste," to Howard M. Messner, Assistant Administrator, May 7, 1986.

though this is inconsistent with the concept that it is the first option to consider in dealing with hazardous waste. Waste minimization/reduction is the responsibility of EPA's Treatment Technology Section (one of six sections), which is within the Waste Treatment Branch (one of three branches), which is within the Waste Management Division (one of five offices and divisions) of the Office of Solid Waste (one of three major components) headed by the Assistant Administrator for Solid Waste and Emergency Response. In a description of OSW's new organization, 32 functions of the Waste Management Division are given. The only reference to waste minimization/reduction is found in the description of the last (32nd) function.

OTA concludes that there is no indication that EPA is planning to give waste reduction major attention in the near term. Organizationally as well as ideologically, the status of waste reduction at EPA is consistent with the subject's historical subordination to pollution control.

CONGRESSIONAL POLICY OPTIONS

The major obstacles to increased waste reduction appear to be more institutional and behavioral than technological. There is no intrinsic economic disadvantage to waste reduction. As an executive of Du Pont said:

Reduced waste will inevitably lead to lower cost for products, and thus, a higher standard of living for all Americans. . . , It will not be the law, *per se*, that will fuel waste minimization efforts, but rather the basic economics of good waste management.¹³

There are, however, economic hurdles or barriers that often must be overcome before short- and long-term economic benefits can be realized. As is explained in chapter 3, the status of our basic science and technical development does not appear to be a major limiting factor for most waste reduction activities. What is of greater importance is how people and organi-

zations perceive the need for waste reduction, how they define waste reduction, how they evaluate a full range of technical ways to reduce waste, and how they decide to implement their decisions.

Based on findings from its analyses, surveys, and workshops, OTA agrees with other studies and perceptions that much more waste reduction is technically and economically feasible. But because waste reduction is an ongoing activity which is responsive to many conditions in industry and to government actions, it is not at all clear what the congressional role is or might be in attaining greater levels of waste reduction nationwide. Many people look to waste reduction as a solution to what they fear is a hazardous waste crisis in this country, but others emphasize changing the current regulatory program within the pollution control framework (e.g., better enforcement and more regulations). Still others fear that the crisis may be defined away, if, for example, EPA redefines hazardous waste so as to greatly reduce the uni-

¹³J. Howard Todd, "Waste Reduction. . . Industry's Challenge," paper presented at Lindbergh Symposium on Environment and Technology, Orlando, FL, February 1986.

verse of materials regulated. In the roster of potential problems the possibility of a new and poor definition of waste reduction ranks high.

OTA has structured the congressional policy possibilities by defining three major options:

- Option I: Maintain Current Program. Current, limited voluntary program is maintained.
- Option II: Improve Existing Programs. Existing regulatory structure is changed and expanded.
- Option III: New Strategy. A new, highly visible waste reduction program is initiated.

These three different options have been made to help Congress clarify the distinctly different choices it has, including the first option of not taking any new action. However, certain specific activities listed for Options II and III might be transferred from Option II to III or vice versa or be eliminated. The three options have been defined to concentrate the discussion on major strategic choices for Congress, rather than to provide a blueprint for exactly how each of the action options (II and III) could be carried out.

Each of the options is discussed below. A comparative analysis follows to clarify the advantages and disadvantages of each option and to show how each option is compatible with a major policy objective.

Policy Option 1: Maintain the Current Limited Voluntary Program

The premise behind this option is that it may be unnecessary for the Federal Government to go beyond the 1984 RCRA reporting requirements on waste minimization in order to stimulate waste reduction. This option can be thought of as a market-driven approach. Although no new major action, such as establishing requirements for waste reduction or offering direct incentives and assistance, would be taken, this option is not a no action option.

First, a strong case can be made about the imperative to maintain a well-enforced pollution control regulatory system. An important

condition for promoting more waste reduction under Option I, therefore, would be to implement and enforce existing pollution control regulatory programs vigorously. Congressional oversight would be critical. Industry says that there are two important driving forces for waste reduction: 1) Congress' direction to EPA to encourage the use of land disposal alternatives, which would drive up waste management costs; and 2) Superfund's requirements that increase costs to generators for the cleanup of toxic waste sites. Yet there is uncertainty about legislative changes and implementation of statutes concerning these critical factors.

Effort is badly needed to gather better information on current waste reduction. In Option I, this imperative could take the form of a study rather than of comprehensive reporting of data by all or most waste generators.

The following arguments support the position that Congress not take any further major action on waste reduction:

- It is too early to conclude that the existing program is either ineffective or too limited in scope.
- There are an increasing number of statements and examples from companies testifying to their interest in and successful implementation of waste reduction programs.
- All the circumstances that are limiting the use of land disposal will continue to increase the cost of all waste management options and provide more incentives for waste reduction.
- The continuing effort to clean up uncontrolled hazardous waste sites under the Superfund program and by the States and industry will increase apprehension about costly liabilities associated with waste generation and management and, hence, motivate more companies to emphasize implementation of waste reduction.
- There is every reason to believe that the successful efforts of industry will be multiplied many times as effective techniques and expertise are transferred more broadly within companies and industries.
- In many large, decentralized corporations the waste reduction policies and programs

established by senior management are just beginning to be implemented at the plant level.

- There are signs that companies, including some waste generators, will find it profitable to develop and sell proven waste reduction technologies to others and to provide assistance to waste generators. A parallel case can be drawn here to what has occurred in the energy conservation area,
- Increasingly, companies will find it profitable to sell new or reformulated raw materials and products which result in waste reduction in the industrial operations of their clients.
- Existing and new State and local waste reduction efforts and such related activities as waste-end taxes and chemical surveys will have increasing positive effects, particularly for smaller companies.
- The implementation of existing environmental regulatory programs may promote waste reduction.
- General Federal budget circumstances as well as problems in many manufacturing industries do not favor initiating a major new Federal program which would cost government and industry significant sums,
- There are signs that insurance companies and financial institutions may provide incentives for more attention to waste reduction.

Some people believe, for all or many of these reasons, that no further major congressional action is necessary for dealing with waste reduction. (These same reasons may also be used to support Federal actions that are not of a prescriptive nature, as in Option III.) Others look to the future and argue that the environmental benefits of widespread and substantial waste reduction are more certain and potentially larger than those that will accrue from the pollution control approach and conclude, on this basis alone, that the government should be directly supportive of waste reduction. Given the past record of regulatory ineffectiveness and uncertainty, they believe that a more dedicated waste reduction effort by the Federal Government is necessary. Specifically, there are

three major concerns about whether Option I would result in comprehensive waste reduction.

First, a fundamental disadvantage of this option is that there is no assurance that the indirect incentive of the cost of waste management and compliance with regulations does indeed work to promote waste reduction. The existence of an indirect incentive does not guarantee that it will lead to the desired effect.

There is no reason to believe that all or most generators have the technical and economic resources to respond effectively even if they perceive the incentive. Actions that require capital investment may be difficult to take, even though eventually the economic payback will be substantial. Relying on the marketplace to operate efficiently clouds significant noneconomic factors, such as uncertainty as to whether the companies have the technical personnel and information to reduce waste. Nor is it certain that there will be organizational priorities which favor waste reduction over competing economically advantageous options.

Whether there is an incentive depends on the economics of a generator's business; for some generators the costs of waste management and regulatory compliance are not a large enough fraction of their costs to warrant attention to or investment in waste reduction. Poor enforcement, low regulatory compliance, and regulatory loopholes may also lower incentives for reducing certain wastes.

Various congressional and regulatory actions reinforce pollution control options rather than waste reduction and can send confusing messages to waste generators. Significant numbers of companies still have a wait-and-see attitude,

Second, a major problem with the current effort is that waste reduction actions are not likely to be multimedia in character. Reduction carried out in the current voluntary framework under RCRA might overlook wastes that are of considerable environmental importance; this is especially true of toxic air emissions. The piecemeal development of environmental programs and the lack of multimedia integration,

moreover, have in some instances resulted in cross-media transfer; that is, what is deemed a successful environmental program can involve the shifting of waste from one medium to another, less regulated environmental medium. It does not result in destruction of waste.

Third, those who are critical of this option also note that it is impossible to know if waste reduction activities now in effect have concentrated on the most hazardous wastes since Federal regulatory programs have done little to distinguish degrees of hazard among wastes and pollutants. (See OTA'S *Technologies and Management Strategies for Hazardous Waste Control*, 1983.) Recognition of the fact that current regulatory programs have many loopholes, move slowly, and are deficient in enforcement may also misdirect waste reduction efforts. In the absence of Federal guidance, waste reduction may result in no, or very limited, environmental protection. It is often difficult to evaluate reports of waste reduction success stories in terms of environmental protection.

More specifically, Option I maybe rendered ineffective because of the following aspects of the current Federal effort:

- The narrow approach of the current waste minimization requirements with regard to what wastes are covered inevitably means that many harmful wastes are not going to be addressed. Wastes not subject to reduction could be increasingly generated and might be put into the environment because of cross-media transfers.
- The lack of clarity with regard to the primacy of waste reduction is likely to mean that many companies will elect instead to use waste management approaches.
- Because of the lack of guidance to industry as to what the term *waste reduction* really means and what it is designed to accomplish, much of the waste reduction that is technically feasible may not occur and that which does take place may result in less environmental risk reduction than is feasible.
- The lack of enforcement of existing pollution control requirements means that

many companies may not meet these requirements.

- The lack of a database or an attempt to create one means that the government and the public may never know whether the current approach is successful.
- Regulatory requirements for pollution control are likely to continue to increase, making it difficult for companies to divert resources to waste reduction in order to respond to the indirect incentive of rising waste management and regulatory compliance costs.

It is sometimes suggested that no new major Federal initiative is necessary because some States have already established nonregulatory waste minimization efforts which include waste reduction. These initiatives originated, for the most part, prior to 1984 and the beginning of limited Federal action under RCRA. However, none of the State programs are well funded, all are relatively new, and their effectiveness in terms of waste reduction cannot be assessed (see ch. 6). Many of the State programs do not focus on waste reduction. For these reasons, current or planned State waste reduction programs, which may be quite successful in dealing with State goals, are unlikely to have a substantial effect on waste reduction nationwide. Yet the State programs are undoubtedly effective to some extent, and they do provide useful information on how a Federal effort might be structured.

Perhaps the most difficult choice for Congress is whether to take any further action in the near future on the waste reduction issue. The key uncertainty about maintaining the current program and relying on the marketplace to operate efficiently has to do with the *pace* of waste reduction and the extent to which it is *comprehensive* with regard to wastes and industries. Those who favor not taking any new Federal action may be correct in believing that *ultimately*—perhaps in some decades—the level of waste reduction might be the same with or without further specifically targeted government action. However, even if this view is correct, Federal action to spur waste reduction

could matter in the near term; more effective environmental protection achieved at an earlier time has environmental and probably economic benefits. OTA concludes that if rapid and comprehensive hazardous waste reduction is the Federal public policy goal, then this option is not likely to be effective.

Policy Option II: Change and Expand Existing Programs

In defining this option OTA has assembled a number of possible actions which might be taken by Congress. They share one important characteristic: they alter or expand the current pollution control regulatory framework but they do not change its character. This option has been designed to suggest ways that Congress could build on the existing environmental statutes and programs and the traditional means of achieving environmental goals. The assumption behind this option is that to reduce more waste the current system has to be modified. There are many actions that could either directly or *indirectly* affect the extent and pace of waste reduction in industry. OTA has focused on several major activities for this option:

1. modify and strengthen the existing RCRA waste minimization reporting and planning requirements,
2. adopt similar reporting and planning requirements for the other major environmental programs,
3. use waste reduction impact analysis for regulatory actions,
4. initiate a periodic chemical survey of industry,
5. mandate amounts of waste reduction to be achieved by industry,
6. tax all wastes and possibly offer rebates for those who plan to reduce wastes substantially or have done so,
7. have EPA do waste reduction R&D, and
8. change government procurement policies. (Unlike the above, this last action is not related to the current environmental regulatory system.)

These activities can be implemented singly or in any combination, and some could be transferred to Option III.

Modify and Strengthen the Existing RCRA Requirements

The current statute is ambiguous and Congress could clarify legislatively that, in the hierarchy of options available to industry, that of not generating hazardous waste in the first place should rank highest. Congress could also provide a clear definition of waste reduction. There is also a need to address problems in EPA's regulations, their implementation, and enforcement which result in a weakening of the indirect incentive to reduce waste; this could be accomplished through congressional oversight.

Another type of action would be to *require* RCRA waste generators and those who need permits for treatment, storage, and disposal facilities to demonstrate their commitment to waste reduction. First, regulations could be established for the submission of detailed waste reduction reports including data which demonstrated the extent of waste reduction carried out and *plans* to which the company is committed, including specific goals against which progress will be measured. Criteria for evaluating waste reduction plans could be established by Congress legislatively. For example, generators could be required to provide technical justification for choosing specific wastes for reduction from among those generated, to give a schedule of the actions to be taken to reduce or eliminate these wastes, and to submit a long-term schedule that establishes when other wastes will be addressed. (See ch. 3 for a more detailed discussion of the considerations appropriate for such a plan.)

Another possibility would be to require that waste reduction plans by generators be certified by professional engineers analogous to the way certified public accountants give professional certification to financial reports. This would address the problem of implementation that arises in regulatory agencies where not

enough people of the appropriate kind would be available to evaluate such plans. Environmental engineers and consultants are not necessarily the best equipped people to deal with the production process in which waste reduction opportunities exist. Perhaps displaced or retired engineers with experience in manufacturing might be given special training to obtain certification as waste reduction auditors.

Second, the submission of waste reduction reports and planning information could be made a condition for obtaining new or renewed RCRA permits. This would increase the need to expedite review of such plans.

Third, fines and penalties similar to those now levied in cases of noncompliance with major RCRA regulations could be applied to waste reduction planning and information requirements.

The advantage of this action is that it establishes Federal waste reduction regulations within the RCRA framework and moves from the largely voluntary state that now exists to a required, focused waste reduction activity.

The chief disadvantage is that past experience indicates that EPA and the States would have limited ability to analyze and assemble the information collected and to enforce the requirements.

Require Waste Reduction Reporting and Planning in the Air and Water Regulatory Programs

Similar to the above three regulatory requirements and actions that might take place within the context of RCRA, Congress could introduce reporting and planning requirements in the programs established under the Clean Air and Clean Water Acts. However, these programs differ in many respects from the RCRA program. For example, the air and water programs generally allow hazardous waste to be released into the environment within certain set limits. Consequently, to require companies to cut back on the generation of what are now legally allowed releases is likely to be construed as a much more radical measure than action under RCRA, which does not regulate the *amounts*

of waste that can be generated. Another complexity would be that waste reduction, defined broadly, would include many wastes not currently being regulated under the air and water programs. Some might argue that if the government is unable to set safe limits for a specific waste in the environment, it has no basis for deciding that a waste must be reduced because of the hazards it presents. If this dilemma arose, there might be pressure to limit waste reduction mandated under the Clean Air and Clean Water Acts to those wastes for which limits have been set for discharge into the environment,

Requiring reporting and planning for waste reduction under the air and water programs poses substantially greater, but not necessarily insurmountable, legislative challenges than would be the case under the RCRA program. Moreover, concerns would be likely to arise about the implementation of waste reduction requirements under the air and water programs. There have been substantial delays in a number of areas, particularly in the regulation of toxic air emissions and the establishment of pretreatment standards for discharges to water treatment plants. Adding waste reduction requirements might divert attention away from pollution control needs. The experience so far under the RCRA program suggests that waste reduction might have a relatively low priority in any existing program at EPA.

Waste Reduction Impact Analysis

An important way to promote waste reduction would be to require that any proposed regulatory action by EPA be accompanied by analysis of its potential impacts on waste reduction. Such analysis would be similar to what is now done, for example, for the economic impact of regulatory actions on industry. There are several reasons for believing that such a measure would be effective. First, it is clear that regulatory programs have a substantial effect on actual and future waste management costs and liabilities and that this influences *some* decisions about waste reduction. Second, there is no reason to believe that current regulatory ac-

tions are seen or evaluated from the perspective of waste reduction.

For example, an action under RCRA that maintained the viability of lower cost waste management options such as landfills, or one under Superfund that reduced the scope or magnitude of waste generators' liabilities, would reasonably be expected to reduce the motivation for waste reduction. Other types of actions can have even more direct effects, such as determining that some wastes become regulated or that others become delisted.

Just performing such analyses would focus attention on waste reduction and might flag actions whose benefits are too limited to offset a significantly negative impact on waste reduction. The fact that such impact analysis might be possible to perform only qualitatively would not necessarily reduce its usefulness. This is the type of measure that affirms the priority of waste reduction.

A Federal Chemical Survey

This would be a program that would require an industrial plant to report all of its waste generation, emissions, and discharges for a broad range of hazardous substances into all environmental media. It could either be an addition to or an alternative to expanded reporting requirements discussed previously in the context of current environmental programs and would include unregulated hazardous substances as well as those now regulated under one or more environmental statutes.

Such a chemical survey would be a form of mass balance analysis which details process inputs and the known or anticipated outputs of hazardous chemicals for a specific plant in terms, for example, of tons per year. However, the link to waste reduction is indirect unless data are obtained for specific processes and the data put on a production output basis.

A Federal chemical survey has already received attention within the framework of congressional reauthorization of the Superfund program.¹⁴ It has been given a high priority by

¹⁴As this report was going to press, Congress had finished its conference committee deliberations on new Superfund legislation. Details of the final bill, however, were not available in time to discuss their relevance here.

some, particularly environmentalists, who feel that the information that would be obtained from such a national survey: 1) is critical to an effective environmental protection program, 2) will inevitably be needed by industry to comply with pollution control and waste reduction requirements, and 3) will provide facts that the public has a right to know. Several States, including New Jersey, New York, and Maryland, are conducting or have conducted chemical surveys, but there has been no long-standing program. Existing surveys have not been designed to measure waste reduction, and because data are not obtained on a process and production output basis they are not able to do so.

State chemical survey programs have intrinsic problems. A recent report made the following comments about New York's Industrial Chemical Survey, which was initiated in 1983:

While the Survey is an invaluable source, the public still cannot obtain information which a company has classified as a trade secret or which it claims will impair present or imminent contract awards or labor negotiations. Outdated information is another complication since only those industries needing a permit or renewal from DEC to discharge hazardous substances or to dispose of solid wastes have to submit updated chemical inventories—and then sometimes at intervals of three to five years. While most of the State's larger companies have responded, thousands of companies still have never replied.¹⁵

Chemical surveys are viewed negatively by industry as a tool for targeting, promoting, and measuring waste reduction. Often industry is concerned that dissemination of multimedia information about their waste outputs, perhaps in conjunction with information on toxic chemical raw material use, will expose proprietary information about its operations. For example, such information can reveal to competitors a firm's production rate and inferences can be made about details of its process. Especially for smaller companies, there are also concerns about the time, money, and expertise required to accumulate data for what maybe enormous numbers of hazardous chemicals. Many indus-

¹⁵Robert Abrams, Attorney General of New York, "Toxic Chemical Accidents in New York State: The Risk of Another Bhopal," January 1986, p. 13.

trial operations make a number of products at different times, and in such circumstances putting together complete information poses particular burdens. Another difficulty arises from the level of sensitivity demanded. For example, a company may know how much of a chemical it releases in terms of tons or pounds but not necessarily in terms of lesser amounts. Getting such information, which may or may not be significant environmentally, could be costly. It would be difficult to expect companies to conform to a precisely specified level of sensitivity in measuring use and output of hundreds of chemicals.

An inventory approach would only benefit waste reduction in a direct fashion if: 1) it was comprehensive with regard to substances (including those created during the industrial operation) and environmental media, and 2) it asked for data for processes within a plant and put the data on a production output basis. It would be very difficult to enforce and it would take resources to collect, analyze, and report the data for all industrial pollutants nationwide. It might be possible to alleviate administrative problems by starting out with a survey of selected industries.

Information obtained from a standard chemical survey has many potential uses, such as worker protection, emergency response, and pollution control regulations, and because of this there has been considerable interest in the approach. But as with any information that leads to greater awareness of the generation of hazardous waste, it may lead to increased efforts by industry to control pollution and its effects rather than to prevent pollution. A classic example is that instead of cutting levels of toxic chemicals in the workplace—perhaps even below regulatory limits—companies may act on information about toxic levels by giving workers masks and breathing devices or by installing sophisticated alarm systems that warn of unsafe levels of contamination.

Survey data could also be used to enforce compliance with government standards on safe levels of waste outputs and could help establish which chemicals should be targeted for research, standard-setting, and waste reduction.

Mandatory Amounts of Waste Reduction

The government has often set acceptable levels for discharges into the environment. In the same fashion Congress could create a regulatory requirement, either as part of RCRA and the other major environmental statutes or through new legislation, which would mandate specific levels of waste reduction over a specified amount of time. This could be done on an industry or waste basis. Waste generated per unit of production could be set by performance standards for industrial processes or through best practice or best technology requirements. (See ch. 5 for a discussion of how this approach is used in current regulatory programs.) This is the way waste reduction has been regulated in Austria, for example.

This approach would rest on the government's ability to determine the amount of waste reduction possible or what the best industry practice is for an enormous range of industrial activities and an even greater number of waste streams. As will be discussed later, because there are so many ways to reduce waste—from changing feedstocks to changing the end product—this type of effort is more demanding than efforts required under existing environmental programs which set specific limits for what comes out at the end of the pipe. Moreover, any such standards might become outdated; even setting standards could act as a disincentive to greater levels of waste reduction that might be feasible for some generators.

A prescriptive approach to waste reduction appears attractive to some, and EPA was directed by Congress in the 1984 RCRA Amendments to study such an option. (Companies surveyed by OTA say that a mandatory approach would be ineffective in promoting more waste reduction.) It is, however, possible to contend that such a system might indeed result in more waste reduction than does a voluntary program.

If the chief advantage of this approach is that it would step up waste reduction, its chief disadvantages are major and not easily solved problems of design, implementation, and enforcement. Lack of flexibility might harm troubled manufacturing industries. There are so

many technical approaches to waste reduction and they are so much a part of the fundamental aspects of production technology that setting levels of required waste reduction would be a formidable task for government. The diversity in American industry has already confounded traditional end-of-pipe regulatory programs, and problems would be compounded many times in a mandatory waste reduction regulatory approach for production activities within plant operations. The information requirements for setting federally mandated waste reduction levels would be so great that it would take years of data collection and analysis before such an effort could begin. In the meantime, there would be considerable uncertainty in industry, which could act as a disincentive to continued voluntary waste reduction. EPA has had major difficulties over many years in establishing comprehensive and reliable databases on waste generation, and for purposes of mandating waste reduction very little of this existing data would be of help.

In order to deal with the problem of acquiring enormous amounts of technical information, proponents of this approach suggest incremental implementation. Administrative problems might be circumvented to some extent by using a prescriptive approach only for some particularly hazardous and widespread wastes initially or for some industries or major industrial processes. Later, with more experience, the prescriptive approach could be applied to either more waste or more industries. However, it is likely that there would be considerable debate over the selection of any waste or industry as the first in a mandatory program. The chemical survey action discussed previously would not necessarily reduce the information burden for establishing required levels of waste reduction, unless the survey obtained process specific data.

One way around many of these difficulties would be for the government to establish waste reduction targets for specific processes or wastes with a provision allowing generators to offer justification for noncompliance based on technical or economic circumstances or to offer a schedule for meeting the target. Instead

of devoting substantial resources to developing mandatory waste reduction levels, softer targets could be used. In this way the burden of proof and effort would be shifted to the waste generator, and considering the site-specific nature of waste reduction, this is not unreasonable. However, targets set by the government might also serve as disincentives, discouraging plants from carrying out as much waste reduction as they could. Yet, because zero waste generation is unrealistic for most situations, some finite, defensible target for waste reduction would have to be set by the government. Setting too high a target for reduction would mean that industry and government would be constantly dealing with requests for noncompliance or delay; a target that was too low would mean that waste reduction which could occur might not. If targets—in contrast to goals, which are discussed later—became just a different form of government required waste reduction, these problems would probably constitute nearly as significant a disadvantage as those for specific prescriptive levels set by regulation.

Taxing Waste

An action which has gained a great deal of support in recent years is that of imposing a tax on the generation of hazardous waste. This approach received considerable congressional attention during the debate on the reauthorization of the Superfund program. It has proven to be a very contentious issue. In a previous study, OTA examined waste-end taxes¹⁶ and this subject will not be reviewed herein detail. In looking at such taxes as imposed by over 20 States and at various proposals for Superfund for RCRA defined waste, it is clear that taxes have been set at too low a level to have a significant impact on waste reduction decisions, especially in comparison to waste management costs born by industry. Most taxes on wastes are less than 10 percent of waste management costs. Although OTA has had a more positive view, there has been considerable opposition to the waste-end tax approach for Superfund,

¹⁶U. s. Congress, Office of Technology Assessment, *Superfund Strategy, OTA-ITE-252* (Washington, DC: U.S. Government Printing Office, April 1985).

on the grounds of administrative problems or a lack of equity (i. e., only some current waste generators who had responsibility for causing Superfund sites are to be taxed). Another objection has been the harm such a tax might cause to some industries facing stiff foreign competition. All these issues and the need to have a relatively high tax rate if it is to affect waste reduction decisions suggest that the taxing approach would face stiff opposition from generators.

Finally, a way to make a waste-end tax particularly useful for promoting waste reduction (rather than just as a means to raise revenues) is to consider the use of tax rebates or credits associated with specific waste reduction activities. The idea would be to offer an incentive to carry out waste reduction. Major problems would probably arise associated with demands for incentives or rewards retroactively from companies that had already carried out waste reduction. Other disputes would center on inequities that would inevitably arise because of the substantially different capabilities of companies and industries to carry out waste reduction.

Waste Reduction Research and Development

EPA's Office of Research and Development (ORD) could establish a program to assist generators in developing waste reduction technology. Indeed, if a mandatory approach was pursued, ORD would be *expected* to develop the technical information base for establishing regulations. However, ORD has faced continuing problems with regard to budgets. As already noted, the diversity of waste reduction approaches, industries, and waste streams implies a large R&D effort. Existing ORD staff would not have the necessary range of expertise and experience. Unless substantial new funding was provided, concerns would be raised that current pollution control efforts, which many believe to be underfunded and slow, might be harmed. But R&D on waste reduction might not, in fact, turn out to be better funded or carried out more quickly than are current programs. Lastly, many sophisticated or cynical people in industry might have trouble accept-

ing the reliability of information for waste reduction developed by EPA or any government agency with strictly end-of-pipe experience. Government personnel are not likely to have the detailed information and experience required on the vast range of industrial production practices.

To overcome these problems, a formal EPA waste reduction technology program could: 1) fund research by industry, with a focus on topics of a generic nature so that there could be broad application of successful results in other companies and industries (e. g., substitution of other substances or less toxic forms of widely used production inputs such as paints, inks, dyes, and solvents); 2) support university programs that not only research technologies, but also help educate and train people about waste reduction; 3) support technical assistance programs at universities or those run by trade associations; and 4) support technical information clearinghouses in States or regions.

Change Government Procurement Policies

For some companies and industries the Federal Government is a major customer and because of this they have special problems in altering inputs or processes for waste reduction purposes. There are cases in which government specifications, especially in the Department of Defense, rigidly restrict a manufacturer's freedom to change either a process or a product in any way and others where more flexibility is allowed. For example, the government can require cadmium electroplating on a product; but such a process will generate cadmium waste which is hazardous. Sometimes, the plating process is specified. But, in other cases cadmium waste can be eliminated or reduced by either changing the process or by using an alternative metal plating, which might lead to increased costs. If the government were to initiate a major program on waste reduction, many in industry could find it difficult to meet *that* government goal because of the restrictive nature of these government procurement policies. Moreover, Federal agencies themselves are waste generators and they are now beginning to examine waste reduction. Government agen-

cies would have to make difficult judgments about the acceptability of cost increases associated with achieving waste reduction goals and they would not necessarily see direct benefits. One way to work expeditiously within the current procurement system might be to use waste reduction waivers whereby a company could succinctly present its case for changing some procurement specification on a waste reduction basis. The burden would be on the company to demonstrate that there would be no effect on the performance of the product and also that the benefit would be an environmentally significant level of waste reduction. Because most major government agencies have substantial environmental staffs, it would not be overly difficult to have in-house experts evaluate these waiver requests,

Overall Evaluation

The preceding discussion has covered the advantages and disadvantages of the various proposed actions included under Option II. But what are the advantages and disadvantages of the option as a whole? If the Federal public policy goal is to achieve rapid and comprehensive hazardous waste reduction, then this option is not likely to be effective for one basic reason. The historic evidence is persuasive that all previous attempts to use our existing pollution control environmental statutes and programs for waste reduction purposes have not been successful. Moreover, not only are the prospects for success unlikely, but the potential for negative effects resulting from inflexibility and high costs, especially for troubled manufacturing sectors, are significant. Those who favor this option, however, may propose that a more focused effort to use the current system for facilitating waste reduction might be effective or that some of the specific actions considered might be effective without adopting the others.

Policy Option III: A New Highly Visible Waste Reduction Program

This option emphasizes Federal support for the primacy of waste reduction over treatment or disposal. Implementation of this option would create a new waste reduction ethic as

well as a new environmental protection strategy. The program that would result would be based on pollution prevention and would complement the current pollution control system, although few new responsibilities would be added to existing EPA programs. One premise underlying this option is that attempting to use existing environmental statutes and programs is not the optimal approach, as evidenced by the history of attempts to include waste reduction as part of pollution control programs (see ch. 5). Therefore, this option entails substantial institutional change and raises more concern about implementation than does Option II.

Federal *assistance* and provision of direct incentives to spur rather than require more waste reduction would be essential aspects of these new efforts. However, a case can be made that there should be some components of this option that place stringent Federal requirements on waste generators. (This does not have to mean that generators are required to reduce wastes by certain amounts.) A further consideration is that public policy relating to U.S. industry must address enormous diversity. Companies are at vastly different stages of waste reduction and face markedly different obstacles to maximizing waste reduction. This option speaks to the need for policy diversity and flexibility. Specifically, six actions are discussed in this option. They are to:

1. establish a grants program,
2. initiate new waste reduction legislation with expanded Federal reporting and planning requirements for industry,
3. establish reporting requirements for financial reports,
4. set up a new Office of Waste Reduction in EPA with an Assistant Administrator,
5. set up regulatory concessions for compliance, and
6. establish and empower State Waste Reduction Boards.

These actions can be implemented singly or in various combinations. Some could be transferred to Option II. The last action in this option requires a brief explanation at this point. The State Waste Reduction Boards suggested by OTA would make the States the primary au-

thorities in implementing a national waste reduction program without necessarily displacing current State efforts or imposing Federal interests on them (see ch. 6). The two chief arguments for promoting State involvement are: 1) the enormous diversity of waste reduction opportunities and problems in industry might best be dealt with by giving government closest to industries the major responsibility; and 2) the need to be sensitive to past and current problems at EPA in implementing its large number of complex programs. The State Waste Reduction Boards, as will be discussed, could be a means of creating a government institution to advocate waste reduction and provide a balance to State pollution control regulatory agencies. Other activities in Option III could, however, be implemented without creating State Waste Reduction Boards.

One other preliminary point needs discussion. This option does not include any form of direct financial assistance to waste generators to implement waste reduction. The main argument against direct assistance is that waste reduction is tied closely to production operations. Therefore, if requests for direct financial assistance were to be considered, it would be difficult to determine how much spending was to be used for waste reduction independent of, for example, modernization of a plant or process. This basic problem has been recognized by some States, including Washington. A report from the State's Department of Ecology says:

Because waste reduction is so intimate to each manufacturing process, it will be very difficult to determine what portion of the cost of a process change is attributable to waste reduction and what portion is due to a company's need to fulfill a new production need or marketing strategy, or to achieve lower production costs. This uncertainty would make such an incentive program difficult to administer and suggests that its cost-effectiveness would be low.¹⁷

¹⁷Washington State Department of Ecology, *Progress Report: Priority Waste Management Study for Washington State Hazardous Wastes*, May 1985, pp. 7-12.

There is also a problem that results from the fact that there are so many ways to reduce waste. A waste generator could obtain funding, pursue several different approaches to reduce a given waste, and then adopt the one that produced the best results. Moreover, government actions to provide direct financial help typically focus on capital investments, and this skews actions towards equipment purchases even though other measures may be appropriate and available. These factors, coupled with the very large number of potential applicants, would mean that large sums of Federal money would be needed for any direct economic assistance program for generators.

For all these reasons, OTA has not considered feasible a number of traditional economic incentives, such as tax credits, deductions, rebates, and exemptions, or direct financing through grants, loans, and loan guarantees. These would not be practical economically or politically at this time. This might change if better information supported such efforts and spending. As has happened in the past with some government financing programs, direct support for waste reduction could mushroom beyond any anticipated levels. If limited sums were made available, the government would have great difficulty in selecting the companies to receive assistance, especially since the government has so little information on waste generation and reduction on which to base assessments of applicants' proposals. Perhaps at some time in the future a strong case might be made for direct financial assistance to waste generators if it became clear that major waste reduction would not occur without it, but that case cannot be made now.

A Grants Program

In the past, environmental grants programs have for the most part given money to State or local government agencies. The program suggested here would instead fund nonregulatory efforts to motivate and assist the private sector *broadly* in carrying out waste reduction efforts expeditiously. The purpose of this program would *not* be to provide direct financial support for specific waste reduction efforts ben-

eficial only to a particular waste generator. Instead, its primary goal would be to help build knowledge, institutional support, and the delivery system so that waste generators could more easily and more effectively meet national goals of increasing the pace and scope of waste reduction. The types of efforts funded could be of importance for larger companies, which generate most of the Nation's waste, as well as for smaller companies. It is incorrect to conclude that all large companies have the resources to devote to these efforts or that they would choose to use significant parts of their resources for this purpose. This is particularly true of companies in troubled manufacturing sectors.

There are a number of purposes for which grants could be used:

- Grants could be made to nonprofit organizations to establish free or low cost technical assistance and technical information transfer programs dedicated to industrial waste reduction efforts. Several States do this already and some trade associations and educational institutions could also become involved through such a grants program.
- Grants could be offered to trade associations, business organizations, and educational institutions to develop and make available to workers—from shop floor to researchers to managers—training materials for in-plant use that would bring attention to and encourage waste reduction.
- Grants would be available to any organization for R&D, pilot tests, and demonstration tests if their proposed project aimed to obtain new waste reduction technology or new waste reduction applications of existing technology, yield lower costs, or expand opportunities for waste reduction activities. These results would have to be broadly applicable to industry segments or generic types of processes, wastes, or materials. An example would be substitution of water for organic solvents in widely used industrial processes. Assistance could be provided to a waste generator as long as the project had applicability to significant

numbers of other generators and the results of the grant-supported work were to be made public.

- Grants would be available for industry or business organizations and educational institutions to establish programs or materials to train and assist industry personnel in complying with waste reduction reporting and planning requirements and in preparing requests for regulatory concessions as discussed below.
- Grants could be used to create programs to train and certify environmental auditors, who could play a major role in assisting industry to identify and implement waste reduction audits, plans, and programs.

For the reasons given previously, the grants program would *not* offer financial assistance to companies for their direct waste reduction costs (except as noted above for new generic technology development), but it would help improve their tools for such an effort. A limited Federal grants program based on the multiplier effect of broadly applicable efforts might be advantageous. A grants program implements the concept of using a positive, *directly supportive alternative to regulations*. Providing technical support to many companies might offer benefits far in excess of the cost to the government, substantially reducing the Nation's generation of hazardous waste.

The chief disadvantage is the possibility of ineffective spending. The success of such a program will be closely related to the amount of funding provided and what is funded. While it is not possible to know beforehand how effective such a grants program would be, it may be a type of effort worth trying at this early stage of waste reduction implementation. A long-term commitment will be necessary, however, if a grants program is to spur in-depth, dedicated efforts which can be applied broadly to industry. A reasonable compromise between the uncertain effectiveness of such a program and the need to offer funding beyond a 1- or 2-year period could be for Congress to authorize funding for a 5-year program. For example, spending about \$50 million (at a minimum) annually for a 5-year grants program would be

approximately equal to the cost of cleaning up 25 or fewer sites under the Superfund program (some 3 percent of National Priority List sites). Put another way, American society spends over \$70 billion *annually* to regulate, control, and clean up environmental pollution; spending less than *one-tenth of 1 percent* of that sum to aid pollution prevention does not appear extravagant.

Concerns are likely to be raised if the responsibility for selecting projects for funding under such a grants program were given to EPA. The chief reason for this is that EPA does not have the relevant experience for administering such activities. As will be discussed later, State boards could select projects for funding and also act as the agents to receive and distribute Federal funds for encouraging waste reduction activities. Sums could be given by EPA to States on some formula basis. Congress may also wish to consider giving preference to those requests for grants that offer cost-sharing, or even to require cost-sharing. With the likely exception of the technical assistance/technical information function, not all of the above activities would necessarily be carried out in all States. Many activities would yield results that could be transferred to other States.

New Waste Reduction Legislation

Consistent with the definition of waste reduction used in this study, Congress could consider new legislation dedicated solely to waste reduction. Such legislation could address the problems of definition and measurement that have already been discussed. It could establish national waste reduction goals. Through such legislation, industry could be required to: 1) provide detailed information on past waste reduction efforts on a plant, chemical, and process or product basis, including their environmental impacts; and 2) provide detailed plans and schedules for future waste reduction with an emphasis on environmental risk reduction. While these would be regulatory requirements, they are not the same as setting waste reduction standards or requiring a certain level of waste reduction. Nevertheless, this sort of stringent Federal requirement brings up important issues

with regard to effectiveness and the likelihood of promoting innovative responses.¹⁸ When it comes to planning and reporting requirements for waste reduction, stringency is provided by setting up a comprehensive, multimedia definition of hazardous waste and by requiring quantitative information (in contrast to current waste minimization RCRA requirements) and specific commitments.

In terms of the congressional legislative process, new legislation might avoid the problem of differing definitions inherent in different environmental statutes considered at different times by a number of congressional committees. New legislation also may be necessary because the following questions are likely to be raised if current environmental statutes and programs are used for a major waste reduction thrust:

- In the context of the air and water programs, does waste reduction apply to wastes for which the government has not established health effects, safe exposure limits, or environmental risks? That is, if the case cannot be made to set regulatory standards for these wastes, can it be made for reducing these wastes?
- Does waste reduction apply below levels set by current regulation as acceptable for discharge into the environment?
- In the context of RCRA, does waste reduction cover unregulated waste?

New legislation could establish the requirements for multimedia waste reduction without undercutting the jurisdiction of existing pollution control statutes and programs.

¹⁸An important conclusion from a review of the environmental regulatory programs was that "the stringency of regulation is an important determinant of the degree of technological innovation." [Nicholas A. Ashford, et al., "Using Regulation To Change the Market for Innovation," *Harvard Environmental Law Review*, vol. 9, 1985, pp. 419-466,] Technological innovations are even more important for waste reduction than for pollution control, because for the former there are more side benefits for the entire production system. Innovation for pollution control may lower costs and reduce pollution, but is not likely to have such broad effects.

Reporting and planning requirements would include:

- data on the amounts of specific wastes generated and their disposition—including all wastes, emissions, and discharges of hazardous substances and not just RCRA defined wastes—to delineate which are being rendered permanently harmless through effective treatment and which are being disposed or dispersed;
- quantitative descriptions on a plant and waste (or product or waste generating activity) basis to substantiate past waste reduction;
- periodic detailed plans to reduce all wastes, even those that are being treated, including quantitative estimates for specific wastes over specific intervals; and
- assessments of the environmental effectiveness of waste reduction efforts; these could be prepared by outside, certified professional engineers or firms specializing in environmental auditing.

Congress could establish generic criteria for compliance on reporting. For example, compliance might be recognized only when an industrial operation provided: detailed and quantitative descriptions of waste generation on a production output basis, timely responses to requirements, attention to all of its hazardous waste outputs, attention to multimedia analysis of waste outputs, attention to degree of hazard of the wastes, and analyses of environmental risk reductions already achieved or to be achieved at the site.

A new waste reduction statute could also establish a national waste reduction goal (see ch. 3). A goal of, for example, 10 percent annual waste reduction for 5 years might be helpful in focusing attention on waste reduction and its implementation. It could serve as a guidepost to, albeit approximately, evaluate the progress of all waste reduction efforts, whether at the plant, company, industry, or State level. However, using such a goal might inhibit a higher level of waste reduction. And yet a company might see the establishment of a national goal as an opportunity for it to demonstrate its ex-

cellence. Either by statute or by guidance under EPA, acceptable ways of calculating waste reduction could be established (see ch. 4).

The chief advantage of new legislation is that it would establish an environmental protection strategy based on waste reduction parallel to existing strategies for end-of-pipe waste management. Moreover, it would help sharpen the distinction between waste reduction and effective waste treatment on the one hand and disposal and dispersal on the other. It could cover wastes not currently covered by statute or regulations. It would make it much more difficult for a purported waste reduction effort to consist of cross-media transfers. Since a definition should be used that states that waste reduction must involve reduction in environmental risk, it might be necessary to classify wastes according to their degree of hazard. If so, this could be done either in the legislation or by directing EPA to establish such a classification. The availability of such information would provide guidance to industry in establishing priorities. Guidance could also be given about site-specific factors that affect exposures to hazardous substances. It could assist industry in assessing exposure levels and, hence, environmental risks.

A major concern about implementation is deciding how the reports and plans would be handled. It would seem apparent that they should be received by appropriate regulatory agencies, with EPA as the obvious choice, but the history of EPA in establishing national databases and information transfer systems has not been good. Thus, it may be attractive to have State agencies play a major role (see section on State Waste Reduction Boards) or, as will be discussed below, to change the organization of EPA. As only a few States have been more efficient than EPA in establishing databases, a new, dedicated EPA effort might be the most effective action.

Reporting Requirements for Financial Statements

If Congress decides that waste reduction is of paramount importance, a case could be made for requiring public corporations to report on their waste reduction to the Securities and

Exchange Commission (SEC). Such reporting would take place in the standard SEC 10K reports required of corporations and used in drawing up an annual report to shareholders or a prospectus for a new securities offering. This requirement could inspire management to give a great deal of attention to waste reduction efforts and their outcomes. Just as waste reduction can be seen as a criterion to assess production technology and environmental protection programs, it can also contribute to assessing the financial well-being of a company. From the traditional perspective of the SEC, therefore, the issue would be whether information on waste reduction fits into the SEC concept of “material facts” which a reasonable investor would want to know.

OTA finds that a case can be made in this regard. Waste reduction information constitutes material facts of importance to investors because there are several links between waste reduction and the financial condition of a company. The more effective waste reduction measures a company accomplishes, the lower its liabilities for all forms of waste management will be. This includes cleanup liabilities, criminal liabilities, and third-party lawsuits under Superfund and RCRA, liabilities associated with transportation accidents and worker exposures, and costs for regulatory compliance in the future, including possible litigation costs. The following comments by an executive of Du Pont are pertinent:

The challenge to reduce the amount of waste generated is directed by the society in which we operate and by our stockholders . . . Stockholders benefit through reduced production costs and a reduction of future liabilities. These increase both short and long term profits.¹⁹

A disadvantage of this approach is that nonpublic corporations would not be directly affected, as they do not have to comply with SEC requirements. On the other hand, knowing that waste reduction information may be required for future actions if the company decides to go public and that such information is being made

public by competitors might encourage even nonpublic companies to respond. Further, with such a requirement in force, lending institutions would probably expect nonpublic companies as well as public corporations to provide this information. In any case, it is likely that only a small fraction of the Nation's hazardous waste is generated by nonpublic companies.

There would, of course, be concerns about the length and detail required for any such reporting, but the formal reporting of waste reduction efforts discussed earlier could generate the information for this action. The government would have to establish clear, standard definitions for waste reduction, including what wastes are covered, what constitutes waste reduction, how it is measured, and what information can be kept confidential. New waste reduction legislation, if it was enacted, might require only summary information. One provision might be that any company could simply state that it was not a generator of hazardous waste and, in that case, it would not have to report anything. Another variation would be to exempt from a waste reduction reporting requirement any company that spent less than a certain fraction of its income on waste management.

Either by statute or through SEC rulemaking, companies could be directed to calculate waste reduction by using specified procedures. For example, waste reduction should be assessed on a production output basis, as discussed in chapters 1 and 4. The following facts might be required of a waste generator in its annual SEC report:

- information for the past 5 years on total waste generated in tons, perhaps in terms of some base year's production (analogous to using constant dollars rather than current dollars) or, alternatively, information on annual spending on waste management for the past 5 years;
- information for the past 5 years on total companywide waste reduction, given as a percentage; and
- a narrative description of the company's waste reduction program, including any

¹⁹H. Owa rd Todd, *op. cit.*

unusual circumstances that account for its results and its outlook for future waste reduction.

Finally, this approach might be more effective if there was a national goal set for waste reduction. In this way investors could assess the company's performance relative to the national goal.

A New Office of Waste Reduction in EPA

Congress could create an Office of Waste Reduction within EPA, directed by an Assistant Administrator for Waste Reduction. If waste reduction is as important environmentally as virtually everyone who addresses environmental issues says it is, then arguably its importance should be reflected in the organization of the Nation's EPA. As discussed previously, under the current organization it is unlikely that waste reduction could be given high priority. If a waste reduction office were placed within a program office, such as the Office of Solid Waste, it would be difficult to establish a multimedia waste reduction effort. Moreover, program offices now appear overburdened with their pollution control efforts.

The implementation of the previous actions might be efficiently handled by an entirely new EPA office if it had sufficient resources and were given high priority by EPA's management. Such an office would be responsible for implementing legislation dealing solely with waste reduction, such as a grants program. It could also play a major role in promoting the development and use of waste reduction technology by collecting and analyzing reports and plans in order to establish an effective national database on waste reduction. It would also be responsible for providing oversight to State efforts funded through EPA.

Finally, concerns that waste reduction efforts might divert attention from current pollution control programs could be allayed if there were a separate waste reduction office in EPA. Also, because current spending on waste reduction is such a small fraction of the EPA's spending—some 0.1 percent—even major increases in the waste reduction area need not affect other pro-

grams significantly. On the other hand, there are valid concerns about increasing the organizational complexity and responsibilities of EPA. But, if waste reduction efforts are successful, then ultimately less government intervention will be necessary since there will be fewer generators and waste management facilities and less waste to regulate.

Regulatory Concessions²⁰

A regulatory concession would economically reward a company that is committed to accomplishing an environmentally significant amount of waste reduction. It acts as an incentive for compliance with national waste reduction policy goals and regulatory requirements. It works also as a way to introduce a degree of regulatory flexibility into the current system and this could facilitate a smooth transition from pollution control to waste reduction. Essentially, it would be a way to alleviate the economic burdens imposed on waste generators who must simultaneously spend money to comply with existing regulations and make investments for waste reduction. Investments for waste reduction may make less economic sense if investments have already been made for pollution control. This approach becomes more important as a company moves from the simplest to the more costly waste reduction measures (see ch. 3) and has economic obstacles to overcome before net, long-term savings can be realized through avoiding repeated compliance costs and liabilities.

Regulatory concessions to the waste generator could include for example:

- environmental permits valid for longer times or deferred while a waste reduction

²⁰This concept is different from emissions trading or a marketable permit system; in these, a waste generator can buy a credit from someone else and apply it to his own activities and compliance. OTA has not considered this an effective approach for waste reduction, mainly because it is likely to remove the motivation for waste reduction for many generators—either because they might be able to buy someone else's reduction, or because they might not be able to sell a reduction. Moreover, this approach is subtly predicated on the government setting some level of waste reduction, beyond which a company would have something in excess to sell, and the difficulty of setting such levels has already been discussed. Finally, EPA's attempt to use emissions trading under the Clean Air Act has not been especially successful.

effort was being implemented on a waste covered by a permit;

- special designations that would enable a plant or company to request priority status in dealings with environmental agencies and programs;
- specific exemptions, variances, or delistings offset by the environmental benefits of the waste reduction in cases in which these concessions can be justified quantitatively by the company (analogous to the bubble and emissions trading concepts under the Clean Air Act);
- special consideration for exemption from regulation to firms with RCRA hazardous waste treatment facilities for certain in-plant recycling or recovery operations; and
- longer times granted for the storage of hazardous waste without a RCRA permit if need is sufficiently substantiated.

It is important to provide assurances that such concessions depend on a strong case being made that a company's successful waste reduction efforts will result in an *overall net improvement* in environmental protection. Waste reduction should be seen as an alternative to pollution control regulations, one that offers more environmental protection in the long term. Another way to examine this approach is in terms of systematic environmental risk management involving a multimedia view of waste and long-term view of beneficial effects.

The idea of regulatory concessions may sound more novel than it really is. Within current regulatory programs there are areas of discretionary power which are used to assist industry. Most often this occurs when economic hardship is given as the reason why a company cannot be in full and timely compliance with regulations. Here, concessions would not be given because a company has trouble complying with existing regulations. Instead, a company would be rewarded for pursuing a new and effective environmental protection strategy. Therefore, an important indirect benefit of using the regulatory concession approach might be to allow a tightening up of current pollution control regulations. The point is to encourage companies to implement waste re-

duction goals rather than to avoid or stretch out compliance with existing pollution control regulations.

Offering concessions for waste reduction might appear to remove the current indirect incentive of conforming to costly pollution control regulations. But this presupposes that a specific waste generator who is faced with current or anticipated costs of pollution control regulatory compliance can also fund waste reduction efforts. Thus, it is important to recognize that regulatory concessions would not remove the current indirect regulatory economic incentive for waste reduction, but rather provide assistance in making a prudent response. The fundamental problem with relying on an indirect incentive is that, as discussed previously, there is no assurance that it will call forth the desired response from most waste generators. The approach of offering concessions is used in Japan to achieve flexibility and economic efficiency in regulatory programs; some of the rewards derive from its regulatory program's requirements and are determined by a local agency.²¹

In principle this approach has already been used by Congress (see ch. 5). For example, the Clean Water Act was changed in 1977 to allow a generator to obtain an extension on a compliance date by:

... replacing existing production capacity with an innovative production process which will result in an effluent reduction significantly greater than that required by the limi-

²¹The concept of using regulator's concessions falls into the broad area of adapting and improving the U. S. approach to environmental protection. A recent study has noted:

I-I. S. firms have spent more in pursuit of environmental goals than have firms in other nations, and environmental regulation has had a slightly more negative effect on the U.S. economy than on the other three nations [Canada, Japan, West Germany] [A]lthough U.S. standards are generally less stringent than those of Japan, environmental regulation appears to have had a more dramatic impact on the U.S. economy than in Japan. Thus, the standards set by the regulator's process might be less important than the manner in which they are carried out [U.S. Congress, Congressional Budget Office, *Environmental Regulation and Economic Efficiency*, March 1985.]

It should be noted that the study was based on analysis of data through 1982. The increasing attention being given by environmental programs to toxic chemicals, therefore, was not yet fully reflected. Regulatory reform to mitigate harmful impacts of regulations on U.S. industry may have increasing importance.

tation otherwise applicable to such facility and moves toward the national goal of eliminating the discharge of all pollutants . . . ²²

This waste reduction opportunity has not been used very much, perhaps partly because the statute provided the same opportunity for use of innovative pollution control technology. Pollution control has been the standard choice in industry.

The concept of regulatory concessions as used here does not necessarily call for innovative technology but rather includes all measures that reduce waste, even if they are not innovative in the usual sense of the word. This is important because placing a requirement for innovative technology has probably been another reason why regulatory innovation waivers (also in the Clean Air Act) have not been particularly successful, even for pollution control.²³ Concessions for waste reduction would place no burden on the generator to demonstrate anything but: 1) a good-faith effort to reduce waste by any means chosen by the generator; 2) that, most importantly, there will be a net, overall environmental benefit; and 3) that within an agreed-upon time the project has succeeded in its objective. Emphasis would be on the fact that the government is prepared to forego short-term, often uncertain benefits for significant, long-term, permanent reductions in environmental and health risks.

Another example of the use of regulatory concessions is in the area of worker health and safety. In 1982 OSHA created three programs that recognize the achievements of companies that are leaders in providing health and safety benefits to their employees and that provide additional opportunities for OSHA/employer consultation and cooperation. Recognition is given

for superior performance by a company. Participating companies, which so far are few, are exempted from OSHA programmed inspections and are promised expedited action on variance applications. The OSHA programs are explicit attempts to promote a more cooperative approach between government and industrial firms and to enhance worker health and safety. But this approach has had its critics, who are concerned about regulatory concessions and the diversion of government resources away from routine regulatory activities.

EPA has expressed concern about the lack of flexibility in RCRA. The RCRA program has recognized its limitations in dealing with specific site conditions: "Despite the complexity, the RCRA program allows little flexibility for the important characteristics of a particular facility." While it is correct that there is always some discretionary power for EPA to exercise within its regulatory programs, these are not now effective:

What flexibility exists through waivers and exemptions is often cumbersome and time-consuming to obtain. Furthermore, because EPA and those regulated believe that waivers or exemptions will rarely, if ever, be granted, they do not use them.²⁴

There are two scientific principles that form the basis for believing that regulatory concessions for waste reduction can make environmental sense. First, wastes vary remarkably in their degree of hazard. Health effects can vary substantially. They can be acute or chronic; they can be temporary, or they can be long term. For some of these effects no curative measures are available, but others are easily treated. Second, threats to health and the environment from the generation of any waste depend on site-specific conditions that determine the transport and fate of the waste in the environment and consequently the extent of exposure to the waste. Both of these factors form the basis for risk management and risk assessment and have posed great difficulties for the existing environmental regulatory programs. To a large ex-

²²Federal Water Pollution Control Act, Section 301(k).

²³Nicholas A. Ashford, et al., *op. cit.* This analysis of the failures of the innovation waiver efforts concluded that:

Assigning exclusive authority over the administration of innovation waivers to an office in a position to accord higher priority and greater attention to the program would promote use of the waivers and prevent misuse . . . a specially designated group, trained to interact with industry . . . should administer the program.

Use of boards, as will be discussed later, is consistent with this conclusion.

²⁴U.S. Environmental Protection Agency, "Hazardous Waste Implementation Strategy," *op. cit.*

tent, they have been side-stepped and current programs do not significantly account for these considerations (although lately EPA has been considering reforms and programs that would address these risk-related factors). Therefore, because current pollution control regulations do not effectively account for degree of hazard of the waste and site-specific risk conditions, regulatory concessions for waste reduction do not necessarily sacrifice environmental protection. If waste reduction focuses on the most hazardous wastes and regulatory concessions on the least hazardous ones, then a net environmental benefit results.

Examples of Concessions .—Examining hypothetical regulatory concessions for waste reduction may be instructive.

Example I.—A chemical plant generates a large quantity of toxic air emissions which will soon become regulated (by the State and then EPA). It could proceed with investing in a pollution control system to reduce the air emissions to expected legal limits, which would create a fairly large amount of sludge for land disposal. Alternatively, it could pursue a change in its process technology which would eliminate almost all of the toxic air emissions but would take 2 years longer than the pollution control approach. The company would rather make the process change because of other benefits but only if it can get the regulatory agency's agreement that it will not have to meet the air emission requirements over the period during which it is implementing the process technology change.

Example Z.—Reduction can be accomplished for a very hazardous waste which, because it is being discharged in large amounts into the air, also poses risk to a nearby population center downwind from the plant. The company's large chemical manufacturing plant also spends considerable sums on a water treatment plant that will soon require capital spending for major renovation. It must reduce levels of certain low-hazard pollutants in order to meet regulatory requirements before the water is discharged into a waterway where dilution would be substantial and where there is no downstream use for drinking water. From the com-

pany's perspective, there is a net economic gain if its reduction to virtually zero output of the currently unregulated toxic air emission can be offset by saving the greater costs of operating and renovating the water treatment plant. Eliminating the air pollution can be more significant environmentally than allowing more waste to go into the river. The company could go through a costly, lengthy process to get a permanent waiver from the requirement to treat the water, but it would prefer a quicker decision hinging on the environmental benefits of the proposed waste reduction.

Example 3.—A small electroplating shop can see a way to greatly reduce its generation of a high-hazard liquid waste which is put into the sewer, but it requires capital spending to change its process to accommodate a new raw material. It could save enough money to offset the new spending within about a year—if it were allowed to accumulate the RCRA waste sludge from its water treatment for more than 90 days without a permit. The company would save money because it would not have to pay a high premium to a waste management firm to collect small amounts of waste. The environmental benefits gained by eliminating the waste that now goes into the sewer are greater than the benefits lost by allowing a longer period for storage of drummed waste.

Example 4.—A medium-sized chemical specialties manufacturer has had a long history of noncompliance and violations. Despite penalties the situation does not improve. The company knows how to stretch out enforcement and seems to accept financial penalties as part of doing business. It rarely seems to take actions which would permanently solve problems such as frequent excessive discharges of pollutants into a nearby waterway. The company knows how to exert its influence as a major local employer. It has learned that regulatory noncompliance is not likely to bring a fatal blow to its operation. As a result of the new waste reduction reporting and planning requirements, the company is able to pinpoint several changes in its production process that could greatly reduce its aqueous hazardous waste stream. It says it is willing to commit a signifi-

cant amount of capital to make the changes (much more than it was paying in penalties), but only if a number of outstanding enforcement actions are dropped. It argues that its violations are chiefly a consequence of the poor design and condition of the treatment plant and that there are no immediate, substantial environmental effects. It says it will give a detailed plan, certified by an outside expert, of its proposed waste reduction program. This example illustrates the difficulty in assessing a trade-off when the long-term environmental benefits are the central concern,

Costs and Benefits.—In assessing the merits of granting regulatory concessions and acknowledging that they do not necessarily imply a loss of environmental protection, it is critical to deal with the regulatory system as it now exists and not to regard it as an ideal, theoretical program. The current situation has a number of deficiencies:

- Environmental regulations are not complied with at a high rate and penalties for noncompliance may not be effective deterrents.
- Much compliance is self-certified and inaccurate, rather than being based on government monitoring of environmental performance.
- Regulations are not necessarily related to environmental benefits because of loopholes and technical inadequacies or because of a lack of health-based standards or inapplicable exposure and risk conditions for a specific site.
- Different regulatory programs provide different levels of environmental protection in terms of risk reduction or exposure to specific chemicals.
- Many pollution control efforts have, to a large degree, become dependent on the limits of available pollution control technology. There are relatively few incentives to push technological development to achieve greater environmental benefits.
- Many aspects of regulatory requirements are procedural and serve bureaucratic or administrative needs, rather than serving to increase environmental protection.

- Over time there have been many compromises in the structure of regulations in which environmental benefits have been sacrificed to avoid undesirable economic impacts on industry.

No matter how a benefits program is designed, some companies or plants will not be able to justify new waste reduction efforts economically. For example, total costs of regulatory compliance may be too low relative to corporate profits for concessions to offset investments in waste reduction. Only a small additional amount of waste reduction maybe possible using regulatory concessions over that without them. But as control regulations drive up waste management costs and as waste reduction costs increase and more capital-intensive efforts are required (see ch. 3), regulatory concessions may become increasingly attractive. The somewhat negative experience with innovation waivers, mentioned earlier, suggest ways to make concessions for waste reduction more successful. For example, such a program would have to be well publicized, be open to new and long-standing waste generators, have clear guidance from the responsible government agency, be free of delays, and have a fail-soft approach in case the waste reduction attempt fails. This means that the regulatory agency granting the concession “ . . . should adopt a sensible enforcement posture that does not unduly penalize the firm. To prevent possible abuse, however, the agency should strictly monitor progress . . . ”²⁵

A disadvantage of regulatory concessions is that there will be some opposition to changing a familiar system of control regulations that has developed over several decades. For example, industry has developed adaptive skills and strategies for acting within its legal opportunities to reduce what it perceives to be unnecessary, ineffective, or overly costly environmental regulations. This is consistent with the American adversarial and balancing-of-opposing-forces approaches to conflict resolution. There will be opposition to a waste prevention approach that shifts the focus to the internal operations

²⁵Ashford, et al., op. Cit.

of industrial activities, even though it might offer greater environmental benefits—without imposing economic burdens. Similarly, organized environmental groups have also developed capabilities for representing their interests within the current pollution control framework. They too are bound to have some anxiety about a loss of effectiveness if prevention is also used as a means to achieve environmental protection. These reservations are also likely to be felt in government regulatory agencies.

State Waste Reduction Boards

One way to implement a Federal waste reduction program, if one is deemed necessary, might be through the voluntary establishment of State Waste Reduction Boards. Boards could provide a means for public participation, disburse Federal grant monies to support waste reduction, review generator reports and plans, and make recommendations on requests for regulatory concessions for complying with Federal waste reduction reporting and planning requirements.

Why create another government organization? The best reason is to demonstrate institutional commitment to waste reduction. Citizen boards have been created for pollution control and the siting of waste management facilities in a number of States, but none have yet been set up for waste reduction. A second reason is that OTA's industry survey found some preference for having the States play the major role in such a program. The preference was particularly common among smaller companies. This approach might be appealing to the general public and to environmentalists if they were assured that they could be sufficiently involved.

Boards or similarly structured commissions are more widely used at the State than at the Federal level. Waste reduction boards at the State implementation level might be effective in assuring that the Federal waste reduction effort, now directed by a part of the existing EPA system, does not become submerged within or overpowered by concurrent pollution control activities. If boards were established at the State level on a national basis, the public could

become more intensively involved in establishing a waste reduction ethic.

One purpose of suggested activities such as establishing State boards is to give greater identity and visibility to waste reduction and to separate it from the dominant pollution control culture. An alternative way of doing this is to create a separate entity within an existing institution, as in the previously discussed action of creating an Office of Waste Reduction within EPA. While this could also be done within existing State agencies, there is some risk that the prevailing emphasis on pollution control might make such an approach ineffective.

Autonomous boards could be open advocates of waste reduction and could:

- bring visibility and independent institutional support to waste reduction;
- promote implementation by those closest to plant operations and minimize Federal bureaucratic involvement and expense;
- promote a direct incentive, nonregulatory approach and move away from a traditional prescriptive approach enforced by penalties; and
- turn towards consensus building among affected parties and away from resolving disputes through confrontation and litigation.²⁶

The establishment of boards would not necessarily bring about conflict with present State regulatory or waste reduction efforts, although opposition from existing regulatory agencies could arise. (See the discussion below on how boards might function relative to regulatory agencies.) Would all or most States choose to have such boards? Not necessarily, but considering the number of States that have, for example, established siting boards, waste-end taxes, and waste reduction programs, those States in which the largest amounts of hazardous waste are generated might choose to give

²⁶For example, the previously cited analysis of innovation waivers addressed the problem of deciding exactly what regulatory benefit to grant: "One solution would be a flexible delay period [for noncompliance] to be determined through negotiation between an innovating firm and an EPA technical review panel." [Ashford, et al., op. cit.] The idea here is that the board could serve the same type of function.

such political and visible support to waste reduction. Much would depend, however, on the level of commitment of State legislative bodies and governors' offices. If a Federal grants program previously discussed were to be given to such boards for implementation, there would be a clear incentive for their establishment.

Particularly because of concerns that regulatory concessions might be undesirable environmentally, such boards would need to maintain a high degree of independence and credibility based on broad representation. Board members should include representatives from State environmental regulatory agencies, industry, trade and business associations, environmental groups, community associations, labor groups, educational institutions, local government officials, and the general public. It might be beneficial if a certain percentage of the board were people with technical backgrounds in order to assure credibility. There are some State entities, generally siting or hazard waste management boards, which sometimes include waste reduction as one of their concerns, that have such mixed representation and have been quite successful in balancing diverse viewpoints. In these boards primacy is not usually given to waste reduction. The lack of reliable information about waste reduction means that priority is given to waste management,

In order to ensure consistency nationwide, Congress might consider having EPA Regional Administrators serve as members of boards within their jurisdictions. But considering the site-specific character of waste reduction, national consistency is less of an issue than it is with, for example, the implementation of a pollution control regulation. If it is deemed essential to maintain consistency nationwide, however, Congress could specify key features of the boards' structure.

Federal funding for operation of the boards and for grants they might administer could be apportioned on some formula basis as part of a budget authorization to EPA; such a formula basis has been used in grants programs to States under existing environmental programs.

As indicated above, the boards could do more than administer and disburse Federal grant funds; they could complement the decisions of existing environmental regulatory agencies about regulatory concessions. It is this suggested role of boards that is bound to be of concern. The interactions of the boards and regulatory agencies are summarized in table 2-1. The key functions of the boards could be: 1) to evaluate the environmental benefits of an industry's waste reduction efforts in relation to a similar evaluation by regulatory agencies of the environmental costs of requested regulatory concessions, and 2) to make a public recommendation to the regulatory agency on whether to grant the concession. Boards, therefore, could serve to analyze, mediate, and resolve conflicts between industry and regulatory agencies (which may be State or EPA). As is the case with regulatory agencies, these boards would be meant to safeguard environmental protection, but the boards would be the advocates of waste reduction while the regulatory agencies are primarily advocates of pollution control.

It is clear that there are significant implementation issues to be addressed. For instance, it is likely that a grants program could be implemented and industry's reporting efforts started *before* mechanisms were put in place for making the difficult decisions about regulatory concessions. A valid concern about concessions would be how to find the technical resources to evaluate proposals from industry properly and expeditiously. One action that would help avoid creating a large bureaucracy might be to have professional and perhaps certified engineers and consultants prepare key parts of both industrial plans for waste reduction and proposals for regulatory concessions, including the assessment of environmental benefits. Indeed, because of the recent upsurge in environmental audits for compliance purposes, there is a growing interest in using certified environmental auditors as certified public accountants have been used for financial records. The use of specialized third parties hired because of their qualifications in a particular area can be an effective substitute for increasing government staffs.

**Table 2-1.—Interaction of Regulatory Agency and State Board:
Regulatory Concessions**

Government regulatory agency	State Waste Reduction Board
1. Receives waste generator's required reports and plans.	1. Same.
2. Receives requests from industry for regulatory concessions including fully detailed support documentation.	2. Same.
3. Makes initial determination that regulatory concession is within legal powers of the agency to grant, and if positive, proceeds.	3. (Board has no complementary role at this step.)
4. Prepares report on any loss in environmental protection for concession. Goes to Board.	→ 4. Receives regulatory agency's report on environmental impact of concession.
5. Receives report on environmental benefits of waste reduction prepared by Board.	← 5. Prepares report on environmental benefits of waste reduction. Goes to regulatory agency,
6. Receives recommendations from Board on granting or denial of regulatory concession.	← 6. Makes recommendation on concession to regulatory agency.
7. Issues decision on regulatory concession.	

SOURCE: Office of Technology Assessment, 1986

Overall Evaluation

As noted in the discussion of Option II, after the pros and cons of various specific actions have been discussed, the probable result of the overall strategy merits attention. If the Federal public policy goal is rapid and comprehensive hazardous waste reduction, then Option III is likely to be the most effective. The chief reasons for this statement are: 1) that the limitations to rapid and comprehensive waste reduction are not fundamentally technical or economic, and 2) that waste reduction is not something industry finds intrinsically unsound. To a large extent, achieving this goal means getting out of a rut; shaking our historic belief that environmental protection is best achieved through end-of-pipe, pollution control techniques. OTA finds that rapid and comprehensive waste reduction may be attainable with a minimum of prescriptive requirements and a maximum of

government leadership that focuses on education, assistance, and persuasion and on unswervingly granting institutional priority and backing to the effort. This option also implicitly acknowledges the significant influence of other public and private efforts (e.g., State and local programs, insurance and financial companies, and environmental groups). These other efforts do not, however, diminish the need for Federal leadership. They do suggest that a middle course between the current voluntary approach and a traditional regulatory one is likely to be the most efficient and effective at this time. The reasons in the discussion of Policy Option I for not pursuing a major Federal initiative also support the middle course. If the private sector efforts in combination with Option III did not prove effective, then a more traditional regulatory approach would be justified and could be pursued.

COMPARATIVE ANALYSIS OF POLICY OPTIONS

The three policy options can be put into perspective in two ways. First, criteria can be set up to evaluate them. Second, we can ask who finds each option attractive and why.

The following are useful criteria:

1. Environmental Benefit: The relative potential of each option to reach a higher level of

environmental protection (than currently achieved) by hastening widespread, comprehensive, multimedia waste reduction.

2. **Costs:** The relative difficulties that each option would face because of constraints on Federal spending and on raising revenues through new forms of taxes or fees. Costs of implementation for industry and government must also be considered.
3. **Ease of Implementation:** The relative administrative and enforcement problems and delays, and uncertainties about effectiveness. These difficulties result from adding new tasks to existing, already burdened environmental regulatory programs or from creating new programs and institutions.
4. **Adverse Impact on Industry:** The relative potential of each option to directly or indirectly harm U.S. industries, particularly older, mature, and troubled ones.

While the first criterion is positive in nature, the other three deal with the negative attributes of the three options. Although more detailed criteria are possible, these four capture most of the concerns and issues surrounding the choices facing Congress. Nevertheless, it is possible for OTA to offer only rough, qualitative—and inescapably somewhat subjective—evaluations for each of the three options. It is OTA's belief that no reliable data exist to perform quantitative analyses of the costs, benefits, and impacts of various policy options for waste reduction. Because a number of actions within options can be eliminated or transferred among options, it is even more difficult to make a quantitative evaluation.

A summary evaluation using the four criteria is given in table 2-2. As shown in the table, Op-

tion I gets the best overall rating and Option III the next best. They differ in all four criteria.

The chief strength of Option I is the low probability of adverse effects, because no new actions are taken. Its chief flaw is the low probability of significant environmental benefits because it does not address weaknesses in the current approach, such as a lack of multimedia coverage. When *only* environmental benefit is considered, this option gets the *lowest* rating.

The chief strength of Option III is that it offers a combination of only moderately adverse effects with the highest rating for environmental benefit. This highest rating derives mostly from the positive effects the grants program, new multimedia legislation (to which waste generators would have to conform in their required plans), and a new Office of Waste Reduction in EPA. The more speculative benefits of other actions, such as regulatory concessions and State boards, were not taken into consideration. The chief weakness of this option is that it requires implementation of new initiatives.

The chief weaknesses of Option II are:

- its potential for causing negative impacts on some U.S. industries, because of the difficulties in using current environmental regulatory programs for comprehensive waste reduction;
- the difficulties of setting a mandatory level for waste reduction;
- the likelihood of high costs for implementation of a chemical survey, and perhaps for enforcing a tax on wastes; and
- its moderate potential for achieving environmental benefits, chiefly because of the

Table 2-2.—Comparative Evaluation of Policy Options

	Policy options ^a		
	I No action	II Improve existing programs	III New strategy
Environmental benefit	Low	Moderate	High
costs	None	Moderate	Moderate
Ease of implementation	High	Low	Low
Adverse impact on industry	Low	High	Moderate

^aSee text for descriptions of options and specific actions included

SOURCE: Office of Technology Assessment, 1966

uncertainty of success in accomplishing multimedia waste reduction within the current environmental programs.

Finally, a general perspective is given for each of the three options. The questions asked are: 1) what is attractive about the option, and 2) what constituency would value that feature?

Option 1: Maintain Current Program

This option is most attractive to those who want: 1) to maintain the voluntary approach to waste reduction unless it is clearly documented to be ineffective; and 2) to keep new actions on waste reduction by Congress and EPA to a minimum, until they can be better supported by reliable information indicating that the progress of waste reduction is slow because of current legislation and regulations. This option is likely to be favored by some companies.

Option II: Improve Regulatory Programs

This option is most attractive to those who want government to move faster with waste re-

duction than is possible under the voluntary approach, perhaps by mandating levels of reduction while maintaining existing regulatory programs. This option is likely to be favored by some environmental interests and some State officials.

Option III: New Strategy

This option is most attractive to those who want strong Federal Government support for waste reduction but to have it implemented as much as possible at the State level. They want waste reduction to have very high priority, visible government commitment, and independent statutory standing as part of developing a new strategy for environmental protection. This option has no clear constituency because this approach has not yet been considered or openly debated. It is likely to appeal to those who find the current voluntary approach unacceptable but who have concerns about traditional prescriptive approaches and about EPA's ability to tackle waste reduction along with its existing responsibilities and under its current mandates,