EFAB Advisory

Environmental Financial Advisory Board

INCENTIVES FOR ENVIRONMENTAL INVESTMENT: CHANGING BEHAVIOR AND BUILDING CAPITAL

The views and opinions expressed in this advisory do not represent those of the U.S. Environmental Protection Agency, nor are they intended to reflect consideration of other fiscal issues which may be overriding in terms of the direction of Administration domestic policy.

August 9, 1991

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Mr. William K. Reilly
Administrator
U.S. Environmental Protection Agency
Washington, DC 20460

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Dear Mr. Reilly:

We are very pleased to transmit to you the first Advisory Statement of the Environmental Financial Advisory Board (the Board). This Advisory presents a series of perspectives related to environmental finance that should raise a debate regarding the appropriate public and private roles in accomplishing the environmental agenda of the 1990s. These include:

- Institutionalizing EPA's public finance capacity to help shape environmental laws and regulations by comprehensively accounting for the budgetary and financial implications of meeting the nation's environmental goals;
- Identifying ways to systematically or incrementally adjust the financial barriers to state and local self-financing through the tax-exempt bond market;
- Endorsing and broadening the transition to economic incentives and market alternatives as supplements to traditional compliance strategies; and
- Demonstrating that public investments in environmental infrastructure can help boost productivity and yield new revenues to offset initial investments.

While this first Advisory makes no formal recommendations, it characterizes the nature and extent of some of the most pressing financial challenges facing the environmental community in the 1990s. Other Advisories address ways to help alleviate constraints on private investment in environmental facilities, improve the efficiency and effectiveness of public environmental investments, and help overcome the financial and managerial limitations that small communities face in providing environmental services.

I would like to thank Frieda Wallison, Vice Chair of the Board and Chair of the Economic Incentives Workgroup for her leadership. On behalf of the entire Board, I would like to express to you our deep appreciation for the opportunity to assist EPA in addressing environmental financing issues while looking forward to providing the support necessary to bring these critical issues to a successful resolution.

Respectfully submitted,

Richard Torkelson
Chair, Environmental Financial
Advisory Board

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EXECUTIVE SUMMARY

The Environmental Financial Advisory Board was established in August 1989 to advise the Administrator on ways to encourage and facilitate investment in environmental facilities. This, the first of the Board's Advisories, presents the analysis of the Board's Economic Incentives Workgroup.

CHANGING THE DEBATE OVER FINANCING ENVIRONMENTAL INVESTMENTS

The Board's single most important observation is that the nature of the debate over the financing of environmental improvements needs to change. Environmental problems of the future will be unlike those of the past, future investments in the environment are expected to be much higher than past levels, and strategies to meet public demands for a cleaner environment must respond. Just as the environmental protection paradigm is shifting from controlling discharges to reducing the generation of pollutants, the financing paradigm must evolve from the notion of spending to one of investment. EPA has a unique opportunity to demonstrate that environmental investments are good not only for human health and the ecology, but for the health and productivity of the nation's economy.

As a sensible first step, this Advisory examines new ways to structure incentives for building environmental capital and discouraging polluting behavior. From a very new perspective, it evaluates the merits of strategies that stress economic incentives and reliance on markets to allocate public and private capital to their most productive environmental uses, with public subsidies provided only to the extent that they leverage efficient and effective overall investment in the environment.

EXPECTED GROWTH IN STATE AND LOCAL ENVIRONMENTAL INVESTMENTS

In reviewing the literature on the rising cost of environmental protection, the Board was struck by two forecasts:

- By the year 2000, the U.S. is expected to invest roughly $260 billion or 2.8 percent of its Gross National Product (GNP) on the environment, compared to two decades ago, when the U.S. economy devoted $26 billion, or less than one percent of its GNP, to environmental protection.[1]

- The state and local share of the public bill for environmental protection is expected to grow to more than 92 percent by the year 2000; just a decade ago their share was 82 percent.[2]

The gap between current investment for environmental purposes and the anticipated needs of environmental programs a decade from now is large. If the gap between investment and needs continues to increase, along with demands for an ever cleaner environment, the demand for state

and local finance also will grow. Some of these demands may be difficult to satisfy without a critical evaluation of current environmental finance policy.

NEW STRATEGIES TO CHANGE BEHAVIOR AND BUILD CAPITAL

This Advisory examines three basic strategies that could change the nature of the debate over environmental finance and establish a legacy of EPA leadership in the field of environmental investment:

- Strengthen and institutionalize an environmental finance capability within EPA, which, in turn, would serve as a guide for the international community;
- Enable state and local governments to self-finance all environmental infrastructure; and
- Reduce the costs of environmental protection through the creation of new economic and market-based incentives.

Institutionalize an Environmental Finance Capability Within EPA

Recognizing the high and rising costs of environmental protection, EPA must strengthen its capacity to work with Congress, other federal agencies, state and local governments, and its counterparts in other nations on issues of public finance.

EPA has a critical role in helping to ensure widespread recognition of the importance of finance as a prerequisite to achieving environmental goals. A symbolic first step would be to add environmental finance to EPA's short list of priority concerns for the 1990s. This action would put environmental finance on a par with pollution prevention, strengthened enforcement, international environmental leadership, enhancement of natural resources, and risk-based priority setting. With greater understanding of environmental finance, EPA leaders could present an environmental perspective on issues of federal fiscal policies in cabinet-level deliberations, public forums, Congressional testimony, and joint ventures with other federal agencies and the international community.

Enable State and Local Governments to Self-Finance All Environmental Infrastructure

Since greater investment in environmental facilities is inevitable, this strategy is intended to combine the power of federal tax policy to leverage responsible state and local investment with the discipline of the public tax-exempt bond market.

Tax-exempt bonds, backed by user fees or taxes, remain the basic instrument used by state and local governments to self-finance environmental facilities. Unfortunately, Congress may not have anticipated that certain provisions of the 1986 Tax Reform Act -- the goals of which were to promote greater tax equity and end abuses within the tax system -- would have negative effects

on financing public-purpose facilities. For example, under the provisions of the 1986 Act, certain improvements in public-purpose facilities will have to be financed through taxable bonds. Over the 20-year life of a $10 million issue, a taxable bond yielding 2 percentage points more than a comparable tax-exempt issue will cost the issuer an extra $2.5 million. Had the issue been tax-exempt, these funds could have been used to reduce the cost of facility improvements or to leverage additional investments in the environment.

In the absence of direct assistance, providing tax exemption on debt issued by state and local governments may be the most effective and efficient way to sustain a small federal investment in the environment. At the same time, the Administrator should be aware of certain potential liabilities associated with advocating a broadening of the tax-exemption. From the perspective of the U.S. Department of the Treasury, such a broadening could have the effect of reducing tax revenues to the U.S. Treasury, at least in the short-run, and would require off-setting revenue gains under the Budget Enforcement Act of 1990.

Reduce the Costs of Environmental Programs by Creating Economic Incentives

The third strategy is simply to reduce the cost of environmental protection -- not by lessening our resolve or moving away from the nation's environmental goals, but achieving them more efficiently by, for example, creating incentives that encourage pollution prevention and reduced consumption.

In the 1990 amendments to the Clean Air Act and in recent publications and seminars, Congress and the EPA have already begun to shift the nation's thinking in this direction. The Board supports the use of economic incentives such as creating markets for tradeable discharge permits, which reduce the cost of meeting environmental quality standards, and effluent fees, which discourage the generation and discharge of pollutants.

ECONOMIC BENEFITS OF INVESTMENT IN ENVIRONMENTAL FACILITIES

Traditionally, the benefits of investment in environmental facilities have been characterized as meeting environmental goals at least cost to the regulated community. Yet such a characterization misses the effects of investment on the economy as a whole.

At the Board's request, new research was undertaken by Dr. David Aschauer, which demonstrates that public investment in environmental infrastructure also increases the productivity of the private economy. By providing environmental services -- water supply, wastewater treatment, or solid waste management -- on a much greater scale than that feasible for a single private entity, public facilities lower private production costs. In addition, expanding public environmental facilities enables private factories to operate at greater capacity, putting plant and equipment to use that might lie idle if access to public environmental management capacity were unavailable.

Assuming that tax-exempt bonds financed an expanded level of environmental infrastructure, the Board's analysis suggests that, within as few as five years, new corporate tax revenues associated with increased productivity within the private sector would more than offset revenue losses associated with net new investment using tax-exempt bonds.

I. INTRODUCTION

The reality of environmental protection is that it is not free. In fact, the cost of building and improving facilities to remove contaminants from drinking water, purify wastewaters prior to their release to natural waterways, and dispose of household and business refuse increases each time the public demands a cleaner environment.

The Environmental Financial Advisory Board (the Board) is charged with advising the EPA Administrator on the financial implications of attaining the nation's environmental goals as articulated in the major federal environmental statutes. In so doing, the Board has considered the potential to reduce the costs of environmental protection and to increase efficient investment of resources to meet environmental mandates. It has found that significant opportunities exist for all levels of government and the private sector to improve the efficiency of environmental finance and to boost levels of investment needed to ensure that environmental goals are met.

PURPOSE OF THIS AND SUBSEQUENT ADVISORIES

The purpose of this, the Board's first Advisory, is to evaluate the merits of economic and market-based incentives to finance environmental improvements. Each strategy considered in this Advisory is based on the recognition of a diminishing federal role in the direct funding of environmental facilities and an increasing reliance on market mechanisms to achieve environmental goals. Whether and to what extent these strategies are appropriate from EPA's perspective remains strictly a matter of Administration policy.

Currently, three other Workgroups are preparing Advisory Statements. The Board's Private Sector Incentives Workgroup is addressing constraints on private participation in environmental services. It is examining full-cost pricing as the first step toward putting public and private provision of environmental services on an equal footing and investigating flexible federal policies that would allow leveraging of federally funded capital assets. It also is examining ways to reduce misperceptions on the part of the public and private sectors about the risks associated with the provision of environmental services, as well as state procurement policies that would promote public-private partnerships.

The Public Finance Workgroup is examining large-scale federal and state approaches to financing environmental public works. Among its anticipated suggestions are a change in the EPA's State Revolving Fund program under Title VI of the Clean Water Act, endorsement of an expansion of that program to wider water quality uses, and the pursuit of program funding at authorized levels. In addition, it is considering the merits of a federal environmental trust fund, state bond banks, and environmental facilities corporations. The workgroup also is reviewing the usefulness of capital needs analyses, finance guidebooks, and other informational products.

The Small Communities Workgroup is focusing on solutions to the finance and management challenges facing small or economically disadvantaged communities. It is interested in three issues: improved coordination among small community financial assistance programs, expanded use of bond banks, and improvements in the Title VI SRFs to assist small communities.

SOCIAL AND ECONOMIC EFFECTS OF ENVIRONMENTAL INVESTMENTS

The benefits of environmental infrastructure are generally characterized in terms of improvements in human health (reduced incidence of disease or death), ecology (restoration of natural or living resources), or public safety (maintenance of environmental services). At times, economists have estimated the dollar value of these benefits. According to one recent study, for example, the nation's clean water programs generated an estimated $14 billion in benefits in 1984. Clean air programs generated another $37 billion in benefits that year.[3] Yet, not all the social benefits of investments in environmental infrastructure are included in such monetary valuations.

It is more difficult to assign a monetary value to other benefits that may arise from environmental investments, such as the provision of outdoor recreation areas or the protection of biodiversity. Many students of environmental economics point out that it is even more difficult to measure the satisfaction people derive from the assurance that a pristine natural region is being protected, regardless of whether this area is accessible to them.

EFFECTS OF ENVIRONMENTAL INVESTMENTS ON PRODUCTIVITY

Investments in environmental infrastructure strengthen the private economy. For example, sound environmental infrastructure enhances the health of the population, thereby boosting economic productivity by reducing employee absenteeism due to illness.

Public investment in environmental infrastructure also directly increases the productivity of the private economy. Public economies of scale help explain this linkage. For example, the cost of water per gallon is lower and productivity greater for a beverage producer using publicly supplied water from a large, central facility than for a comparable producer self-supplying water at a smaller scale. Public investments, such as in the enlargement of wastewater treatment plants, also allow private factories to operate at greater capacity, putting plant and equipment to use that might lie idle if the capacity of environmental services was insufficient. A recent study found that a one-time federal investment in water supply and wastewater treatment facilities of $2.5 billion (equivalent to 1 percent of the value of all wastewater facilities in 1989) would result in sizeable productivity gains in the private sector. If these gains were taken as higher profitability, they would result in net new tax revenues to the U.S. Treasury that would exceed the original investment within an eight-year period[4] -- that is, because public investment improved private sector productivity, the original public outlay could be paid back within eight years.

FUNDING GAP FOR ENVIRONMENTAL FACILITIES

There is a large and growing gap between the investments required to meet the objectives of major federal environmental mandates for clean air and water and the resources currently devoted to such efforts. In 1987, the states and local governments invested about $10 billion to build facilities for environmental protection.[5] By the year 2000, if recent trends continue, about $17 billion a year will be needed just to maintain 1987 levels of environmental quality. This

amounts to a gap of $7 billion per year between current investment and future investment needs to comply with federal environmental mandates.

Two factors are driving environmental protection costs up. First, the cost of providing a base level of environmental protection within growth areas increases as population increases. Second, real dollar outlays for environmental protection have outpaced inflation. For example, the average annual cost per person of operating the nation's wastewater treatment plants has more than doubled in real dollar terms from $15.80 in 1960 to $37.20 in 1984.[6] These costs reflect the growth of environmental services in response to demands by the American public for cleaner lakes and rivers, safer drinking water, and more responsible handling of municipal garbage.

The $7 billion a year gap between current investment and the future requisite resources to maintain today's level of environmental quality, is just the beginning. By the year 2000, state and local governments will have to invest another $2 billion a year to build new facilities in compliance with 22 new federal environmental regulations that have been promulgated or are being developed. This amounts to a total gap of over $9 billion a year between what state and local governments invested in 1987 and what they are expected to invest in the year 2000 for environmental capital facilities in compliance with federal mandates.

Greater efficiency in meeting environmental goals could narrow the gap somewhat. However, the above cost estimates are conservative, and the gap could be substantially larger than portrayed here. Estimates do not include the costs of many new regulations under development, the costs associated with new Congressional mandates (such as the 1990 Clean Air Act Amendments), or the growing number of new state and local environmental mandates.

Less is certain about the amount of state outlays that may be needed for environmental programs (as opposed to environmental facilities) in the future. However, a recent EPA study suggests that the costs to states of administrating water programs in 1987 will more than double by the year 2000.[7] State administrative costs could triple by the year 2000, if the air and solid waste programs impose similar demands.

The key issue in examining the impact of environmental investment on capital markets is the ability of state and local governments to support higher levels of capital formation. If the gap between current capital formation and future capital requirements for environmental facilities were to be financed entirely with new bonds, for example, municipalities and states would have to issue about twice as much environmental debt as they currently do.

CLOSING THE GAP

This Advisory considers three basic strategies to help close the gap between current environmental investment and future environmental investment needs:

- Making environmental finance a cross-program Agency priority;

- Reducing the cost of achieving environmental goals by creating economic and market incentives to reduce pollution and discourage overconsumption of environmental amenities; and

- Financing remaining environmental capital needs by making more efficient use of tax-exempt bonds.

II. INSTITUTIONALIZING ENVIRONMENTAL FINANCE

The Board has concluded that environmental policymakers often underestimate the critical role that finance inevitably plays in the achievement of environmental goals. Similarly, those concerned with fiscal and tax policies may not fully understand the effects their proposals can have on seemingly unrelated areas such as environmental policy. Without an adequate dialogue linking these disciplines, the achievement of environmental mandates will be constrained and may ultimately be undermined.

This section identifies ways for EPA to play a significant role in ensuring that issues of environmental finance command priority attention within the agency's planning, budgeting, and rule making processes -- in short, integrating an environmental finance ethic in EPA's day-to-day activities.

A. STATEMENT OF THE ISSUE

Within broad statutory authorities, the EPA Administrator has the ability to direct Agency priorities. Since taking office, the Administrator has articulated a series of themes intended to guide the Agency's administration of environmental programs:

- pollution prevention,
- strengthened enforcement of environmental regulations,
- a greater leadership role for the EPA in international environmental issues,
- enhancement of natural resources,
- management of EPA's programs for environmental results,
- risk-based priority setting, and
- a strengthened role for science in environmental decision making.

The implementation of these priorities and the realization of benefits from these initiatives will require major investments by all levels of government. The question that must be addressed is how will these governments raise the funds needed to accomplish environmental goals? The Board believes EPA has a leadership role in working with other federal agencies, the Congress, states, localities, and the private sector to develop the capacity to finance environmental services. One prerequisite is strengthening EPA's own capacity to provide a financial perspective on environmental goals.

The Board has found that financing of environmental services represents a major segment of unfinished business in environmental protection. Without a fundamental recognition of the importance of financing issues, EPA and the federal government will have significantly less

potential to achieve their goals. Similarly, states and localities will find it increasingly difficult and costly to build the environmental facilities needed to comply fully with national environmental objectives.

B. DISCUSSION

There would appear to be great latitude within the Agency to improve awareness of the importance of environmental finance and to increase agency interaction with decision makers and legislators on issues of financial capacity. The Administrator may wish to consider the following steps to take advantage of this latitude:

- Adding environmental finance to EPA's list of priorities;
- Strengthening and expanding EPA's role of financial analysis in rulemaking; and
- Strengthening the Agency's capacity to provide advice on environmental finance to administrators and legislators.

Add Environmental Finance to EPA's List of Priorities for This Decade

By adopting environmental finance as a priority concern, the Administrator would send a message to all senior managers about the importance of integrating finance into their day-to-day programs.

Benefits. Adding environmental financing to the Administrator's list of priorities would affirm EPA's commitment to protection of public health, assurance of public safety, and preservation of the nation's natural environment. This action would build EPA's capabilities to contribute to administrative and legislative debates on financing environmental public works. A strengthened EPA stance on the importance of finance also would support the Agency's recent international activities as well as its relationship with state and local governments.

Concerns. Despite its relevance and in some cases urgency, the addition of another priority in times of budget austerity could put pressure on other Agency activities. Elevating environmental finance above other matters could displace funds that had been earmarked for other agency programs and cause some discontinuity in those programs.

Strengthen the Role of Financial Analysis in EPA's Regulatory Process

Strengthening requirements for financial analysis as part of EPA's rulemaking process would help assure that financing issues received more attention within the Agency than they now do. Agency rules that define what is and is not acceptable as a Regulatory Impact Analysis (RIA), pursuant to Executive Order 12291, could be modified to require (1) analysis of the affordability of major new rules and (2) development of fiscal plans or financial strategies to assure that compliance is not impeded by questions of ability to pay. Similarly, rules on the

scope of Regulatory Flexibility Analyses (RFAs), which focus on the degree to which small public and private entities are affected by major regulations, could be modified to examine issues of public affordability as well as ways to mitigate unmanageable financial burdens.

In the past, RIAs and RFAs have not commanded as much attention as they probably should have. EPA could review these documents carefully to assure that they adequately addressed affordability issues from the perspective of states and localities and that the offices promulgating rules were receptive to rule changes when RIAs and RFAs indicated potential financial hardship.

Benefits. The most obvious benefit of taking these steps would be the immediate institutionalization of environmental finance in rulemaking processes. Another benefit may be some standardization of the methods for assessing affordability. Such standardization would occur to the extent that one group within the Agency would take the lead in comparing approaches to analyzing affordability and recommending Agency-wide procedures for amending rules as appropriate.

Concerns. Methods for assessing affordability may not be sufficiently sophisticated to indicate how implementation of a national rule will affect individual state and local governments. This lack of sophistication could complicate or protract the rulemaking process, the length of which is already a subject of some concern.

Strengthen Agency Capacity to Provide Administrators and Legislators with Advice on Environmental Finance

Where needed, EPA could strengthen the capacity of its key offices to evaluate the effects of federal legislation on the ability of state and local governments to finance environmental public works. Some Agency headquarters and regional offices already have such a capacity; attention to issues of finance is less well developed in other agency offices.

Benefits. Enhanced capacity to respond to legislative inquiries concerning environmental financing would strengthen EPA's role in environmental finance and significantly improve the chances that others would recognize the importance of financial capability to achieving environmental goals. By working with the relevant legislators as issues are debated and policies are formulated, the Agency would have the opportunity to build in safeguards for adequate financing, rather than to react to a lack of financial resources once proposals are passed into law.

Concerns. Congress must seek EPA insights for this activity to be effective. In its hearings, Congress customarily requests EPA testimony on a wide variety of issues. Nonetheless, Congress does not typically view EPA as a source of information on issues of finance.

III. IMPEDIMENTS FACING TRADITIONAL FORMS OF STATE AND LOCAL FINANCING

Environmental facilities provide essential services such as purifying drinking water; cleaning rivers, lakes, and streams; and safely disposing of refuse. The U.S. Congress and most state legislatures have chosen to regulate the delivery of these public services to ensure that the tens of thousands of government agencies and private firms delivering them will observe minimum standards of public health, safety, and environmental protection. Historically, the federal government has augmented its regulatory role by offering direct financial assistance (in the form of grants and loans) and indirect financial aid (in the form of tax benefits) to states, local governments, and private firms that deliver environmental services in compliance with national standards. Joint implementation of and shared financial responsibility for national mandates has formed the foundation for an intergovernmental partnership in environmental improvement.

The Board has observed, however, that changes in fiscal and tax policies in the 1980s have reduced both direct and indirect federal support to state and local governments. A reduction in either kind of support has the potential to impede the efficient pursuit of national environmental goals. Together, reduced direct federal spending and limitations on tax-exemption of state and local environmental bonds will almost certainly mean that states and municipalities will face serious challenges in financing environmental mandates.

Changes to fiscal policies and their effects on federal environmental grants and loans have been well documented in recent EPA and other reports.[8] Much less attention has been focused on the effects of new tax policies on environmental finance. In this first Advisory, the Board has taken the initial steps toward providing such analysis.

A. THE IMPACT OF THE 1986 TAX REFORM ACT ON FINANCING STATE AND LOCAL ENVIRONMENTAL INVESTMENTS

While the goals of the 1986 Tax Reform Act -- promoting greater tax equity and ending abuses within the tax system -- are meritorious, Congress may not have anticipated some of the negative effects of certain provisions of the Act. In its study of the Act, the Board has concluded that some of the Act's provisions hinder the achievement of environmental goals.[9] On one hand, environmental policies call for strengthened enforcement of existing mandates plus the addition of many new environmental protection and enhancement programs. On the other hand, current tax policy makes it difficult for state and local governments to comply with environmental mandates at low cost.

Tax-exempt bonds have been an important vehicle for financing investments in environmental infrastructure. The 1986 Tax Reform Act appeared to have little measurable effect on the volume of tax-exempt and taxable bonds issued to finance water, sewer, and solid waste facilities over the 1977-1989 period.[10] However, the Act had the unintended effect of increasing

costs for public-purpose environmental facilities.[11] Four major factors contributed to this increase:

- **Higher tax-exempt interest rates.** The Act required states and localities to offer higher tax-exempt rates on some types of bonds. According to some estimates, the rates reflect increases of 15 to 30 basis points. (100 basis points equal one percentage point.) These higher rates must be offered to investors to compensate for the imposition of the alternative minimum tax.

- **Reduced attractiveness of tax-exempt bonds for certain institutional investors.** Provisions of the Act narrowed the market for tax-exempt bonds by eliminating certain types of large-volume institutional buyers. Between the first quarter of 1983 and the first quarter of 1989, for example, bank ownership of tax-exempt securities declined by more than 35 percent, from $231 billion to $150 billion. This development, in turn, has generally tended to destabilize the market and increase bond interest rates.

- **Delays in issuing tax-exempt bonds.** Some provisions of the Act have delayed financing of many environmental projects. According to a recent analysis, requests for some $2.4 billion in solid waste, water, and sewer bonds were denied or delayed in 1989 because of the Act's limitations on the volume of private-activity, tax-exempt bonds that states can issue each year.[12]

- **Restrictions on tax-exemption of bonds.** Because the Act restricted the amount of private-activity, tax-exempt bonds that can be issued each year, many states and localities have had to issue public-purpose bonds as taxable bonds. The interest rates for taxable bonds are 2 to 3 percentage points higher than the rates for tax-exempt bonds. Between 1986 and 1989, the average spread between Aa-rated tax-exempt municipal bonds and taxable bonds of comparable quality was 2.24 percentage points.

Fortunately, the goals of the 1986 Tax Reform Act need not be pursued at the expense of failure to implement environmental policies. The Board has found that the goals of the Act can be preserved while making low-cost, tax-exempt financing available for investments in public-purpose environmental facilities. By identifying those circumstances in which the 1986 Tax Reform Act discourages the availability of such financing and evaluating strategies to overcome the negative effects of the Act on financing environmental infrastructure, this Advisory hopes to promote improvements in environmental quality without engendering tax abuse.

B. RECENT DEVELOPMENTS IN TAX POLICY

Since passage of the 1986 Tax Reform Act, a number of studies, commissions, and proposed statutes have attempted to draw attention to the Act's effects on environmental finance. Among the most prominent are the following:

- The Anthony Commission Report on Public Finance;

- The Environmental Infrastructure Act of 1991 (S. 90);
- Representative Anthony's 1991 tax simplification proposals (H.R. 710); and
- The Environmental Infrastructure Financing Act of 1991 (H.R. 2172).

Many of the proposals for alleviating the negative effects of the Act on environmental finance that were advanced in these reports, acts, and proposals were recommended to the House Ways and Means Committee during the 101st Congress as ways to simplify the Internal Revenue Code.[13] These proposals are summarized below.

The Report of the Anthony Commission

The Anthony Commission Report on Public Finance, released October 1989, reviewed the history of tax-exempt financing and examined the effects of current federal law on the ability of state and local governments to access the tax-exempt bond market.[14] The commission found that while federal support for infrastructure projects was declining, the 1986 Tax Reform Act both reduced access to the tax-exempt bond market and made bonds more costly to state and local governments. To increase the availability of tax-exempt financing for necessary capital improvements, the commission's report made the following principal recommendations:

- Treat bonds as tax-exempt public-purpose bonds if the facility financed is publicly owned and operated or if the primary benefits from a privately owned and operated facility accrue to the community as a whole, rather than to private parties.
- Create three categories of public-purpose bonds: governmental bonds, public-activity bonds, and exempt-purpose 501(c)(3) bonds.
- Eliminate the taxation of interest on tax-exempt, private-activity bonds that is required by the alternative minimum income tax provision and increase the current $10 million small-issuer exemption to $25 million to facilitate placement of tax-exempt debt with banks.
- Create substantial exemptions from arbitrage rebate requirements that encourage prompt expenditure of bond proceeds for public purposes, to lower the cost and burden of current arbitrage rebate restrictions. Eliminate the requirement of a rebate if the issuer spends at least 25 percent of bond proceeds within one year, at least 50 percent within two years, and at least 95 percent within three years.

The Environmental Infrastructure Act of 1991 (S. 90)

The Environmental Infrastructure Act of 1991 (S. 90) was introduced in the 102nd Congress by Senators Domenici, Boren, and Symms to make it easier for state and local

governments to issue tax-exempt bonds for pollution-control facilities. The bill's major provisions can be summarized as follows:

- Amend the Internal Revenue Code of 1986 to create a new category of tax-exempt bonds to be known as "infrastructure bonds." Such infrastructure bonds are defined as any state or local bond from which 95 percent of the proceeds are used to provide sewage facilities, solid waste and certain hazardous waste disposal facilities, water supply facilities, and other pollution-control facilities needed for state and local compliance with federal environmental statutes and regulations.

- Amend the tax code definition of "private-activity bond" to exclude the new "infrastructure bond." This change would reclassify such private-activity bonds as "governmental bonds." Governmental bonds are not subject to the constraints (i.e., volume caps, the alternative minimum tax, and the prohibition against advance refundings) imposed on tax-exempt bonds by the 1986 Tax Reform Act.

- Modify the arbitrage rebate requirements to permit state and local governments to retain earnings from the temporary reinvestment of bond proceeds. Such a modification would allow state and local governments greater flexibility in managing bond proceeds and would lower the costs of bond issues.

- Assign a 7-year depreciation period to pollution-control infrastructure facilities if these facilities are financed with tax-exempt bonds or a 10-year depreciation period if they are leased to a tax-exempt entity.

1990 Tax Simplification Proposals

Representative Anthony's proposals to simplify requirements for tax-exempt bonds were introduced in H.R. 5423 during the 101st Congress. Many of the same proposals were reintroduced in H.R. 710 in the 102nd Congress. Specific provisions of the Anthony bill would:

- Raise the small-issuer exemption on arbitrage rebate restrictions from $5 million to $25 million and eliminate the requirement that government units must have general taxing powers to qualify for the rebate exemption.

- Make the 1989 rebate relief provision retroactive to bonds issued after August 31, 1986, with no refunds for rebates already paid.

- Raise the small-issuer bank interest deduction exemption from $10 million to $25 million.

- Repeal the 5 percent unrelated and disproportionate use rule.

- Eliminate yield restriction requirements if a rebate is paid.

- Require that only 95 percent of arbitrage be rebated.

The Environmental Infrastructure Financing Act of 1991 (H.R. 2172)

The Environmental Infrastructure Financing Act of 1991 (H.R. 2172), proposed by Representative Guarini adopts many of the same approaches as the other proposals aimed at eliminating the negative effects of the 1986 Tax Reform Act on environmental finance. Specifically, this legislation would extend tax-exemption to bonds used to finance solid waste recycling facilities; exempt bonds used to finance environmental facilities from volume caps and the alternative minimum tax; allow tax-exempt advance refunding of public-purpose environmental bonds; and ease restriction on costs of issuance and arbitrage rebate for public-purpose environmental bonds.

The following sections explain the significance of current tax policy within the context of financing environmental facilities.

C. STATEMENT OF THE ISSUE

The 1986 Tax Reform Act created two major categories of bonds that are eligible for tax-exempt status: governmental and private activity.[15] A bond is classified as a private-activity bond if 10 percent or more of the proceeds from it will accrue to a trade or business and more than 10 percent of the security pledged to repay the bond will come from private sources. Many bonds for drinking water, wastewater, solid waste disposal, and hazardous waste treatment and disposal facilities are classified as private-activity bonds. While private-activity bonds can be taxable (see below), those that are tax-exempt require a higher yield than comparable tax-exempt governmental issues.[16]

The cost of raising capital under tax-exempt, private-activity bonds is higher than that under a governmental bond for two reasons. First, higher yields must be offered to compensate for the additional restrictions placed on private-activity issues. Second, limitations on the use of bond proceeds to pay the costs of issuing private-activity bonds restrict the availability of tax-exempt financing or require contributions from other, higher-cost supplemental funds, if available.

Interest on private-activity bonds is taxable if more than 5 percent of bond proceeds finance an activity that is unrelated to the government use being financed with the bonds. Because of this rule, many issues intended to finance governmental purposes could fail to qualify for tax exemption altogether. The cost of raising capital under a taxable bond is significantly higher than under either a tax-exempt, private-activity bond or a governmental bond.

D. DISCUSSION

There are both benefits and concerns associated with implementing several of the most recent proposals on the tax treatment of state and local bonds for environmental purposes (as presented above). The Board has considered these proposals and offers its own perspective, which follows.

The first, and most comprehensive of the Board's proposals is the reclassification of environmental bonds as governmental bonds, if the proceeds of the bonds are used exclusively to finance the provision of public-purpose environmental services.

The Board has also considered the following four proposals (they would not be necessary if the first Board proposal were adopted):

- Exclude bonds used to finance public-purpose environmental facilities from state volume caps;
- Eliminate the currently imposed restrictions on costs of issuing tax-exempt, private-activity bonds used to finance environmental facilities;
- Exempt interest earned on bonds issued to finance public-purpose environmental facilities as a tax preference item for the purpose of calculating the alternative minimum tax on personal and corporate tax returns; and
- Allow advance refundings of tax-exempt, private-activity bonds used to finance environmental facilities.

One other Board proposal is to enable issuers of tax-exempt bonds to earn interest on bond proceeds without penalty over a reasonable period of time for construction of environmental facilities, provided that excess interest earnings (earnings above the bond yield) are used exclusively to reduce the size of the bond issue.

Using tax incentives of almost any kind requires a tradeoff between the desirability of intended policy goals and the potential loss of tax revenues. Some argue that, almost by definition, tax incentives can be a relatively blunt instrument to effect policy changes.[17] Others maintain that federal exposure to potential costs is unbounded when tax incentives are made available with few restrictions on use and amounts.[18] Yet the Board has concluded that tax incentives can be structured to avoid unexpected costs and targeted to achieve desired results. Moreover, compared to traditional forms of direct assistance, tax incentives allow recipients great latitude in making investment decisions, with relatively low federal administrative costs. The following sections offer the Board's observations on how effective each proposal might be in meeting environmental goals, what other benefits each proposal may offer, and what types of fiscal and institutional concerns are associated with each proposal.

The Reclassification of Environmental Bonds as Governmental Bonds

Public-purpose bonds for environmental projects could be reclassified as tax-exempt governmental bonds, subject to certain restrictions. To protect the federal interest and ensure that the goals of the 1986 Tax Reform Act are preserved, reclassification could be limited strictly to state and local bonds that finance environmental investments undertaken to comply with federal statutes. Congress could help ensure that tax incentives are used to promote only the highest-priority federal interests by periodically redefining what bonds would and would not qualify for tax exemption.

Further restricting reclassification to bonds that finance facilities providing environmental services to the general public would help direct tax incentives to government units. For example, a bond issued to finance air pollution controls at a manufacturing facility would not qualify for reclassification as a governmental bond, even though the pollution controls might be needed to comply with the federal Clean Air Act, because such a facility does not provide an environmental service to the general public.

One issue associated with reclassification is whether private owner-operators of environmental facilities financed with governmental bonds should continue to deduct depreciation as a business cost. The Board has concluded that private owner-operators of environmental facilities that provide generally available services to the public should retain the ability to depreciate their capital plant to the extent allowed under current tax law. However, private entities should pay taxes on the profits they earn from goods or services made possible by their investments in capital plant or equipment. From the perspective of tax policy, allowances for depreciation of that capital plant should be made in the recognition that capital facilities deteriorate over time, resulting in lowered ability to generate profits. Depreciation is a traditional way to encourage and maintain the productivity of privately owned and operated capital facilities.

Depreciation should be made available only to private owners and operators of environmental facilities. In the Board's opinion, bonds to finance environmental facilities that are owned, but not operated, by private entities should retain their private activity status and hence should not necessarily be tax-exempt. This provision would discourage private owners who fail to take an active role in providing environmental services from participating in transactions that are driven principally by tax benefits.

Benefits. Reclassifying public-purpose bonds for environmental projects as tax-exempt governmental bonds could significantly reduce the cost of financing environmental facilities. Specifically, it would alleviate the following serious restrictions now associated with private-activity issues: (1) statewide ceilings on the volume of tax-exempt, private-activity debt that may be issued each year; (2) limitations on the costs of issuance that may be financed with bond proceeds; (3) inclusion of interest earned on private-activity bonds as a preference item in calculating individual and corporate alternative minimum tax; and (4) prohibitions against any advance refundings.

Concerns. According to the U.S. Treasury's model, classification of all bonds for environmental facilities as public-purpose governmental bonds could result in a loss of federal revenues totalling between $400 million and $1.4 billion between 1990 and 1995.[19] Under this model, the most likely loss is $941 million. This estimate is based on the assumption that any additional environmental debt that is issued displaces an equal volume of taxable debt, thus reducing federal revenues from taxes on interest earnings. The $400 million to $1.4 billion range results from using the U.S. Treasury's model to evaluate the revenue effects of changing the volume of tax-exempt debt under different assumptions concerning the marginal tax rate of purchasers and beneficiaries of bonds, whether state and local governments would lower taxes as a result of decreased costs of capital, the marginal tax rate of bond beneficiaries (those who pay state and local taxes), and interest rate differentials between taxable and tax-exempt bonds.[20] The Treasury's model is similar in design to the Joint Tax Committee's model of revenue losses associated with changes to the U.S. Tax Code.

Revenue losses may not be the only effect of issuing more tax-exempt debt. Another effect could be revenue gains attributable to (1) the issuance of more tax-exempt debt as a result of reclassifying public-purpose bonds for environmental projects as tax-exempt governmental bonds, (2) productivity increases in the private sector when the increased level of bond issuance results in increased investment in environmental infrastructure, and (3) increased profits in the private sector and hence increased tax revenues as a result of increased productivity.

A benchmark estimate of the potential revenue gains from environmental investments may be obtained in the following manner. The projected net increase in environmental bonds issued as a result of reclassification -- from $3.305 billion in 1991 to $6.193 billion in 1995 -- is taken to induce an equal increase in the stock of environmental capital facilities. This increase in stock is assumed to generate a rate of return -- measured in the form of higher economy-wide output -- of 15 percent. The increase in output implies a proportional increase in profitability, and, to the extent that profits remain on corporate bottom lines, greater productivity implies an expansion in tax revenue.

Assuming a relatively conservative 15 percent average rate of taxation applied to corporate income, as well as the realization of productivity gains in the year of new investment, projected new tax revenues over the period 1991 to 1995 of over $1.3 billion would eclipse the projected revenue loss of $941 million over the period 1990 to 1995 for a net revenue gain of $369 million. Under different assumptions -- namely, that a construction lag delays the realization of productivity gains and that public investment crowds out private investment in the near term -- tax revenue gains to offset revenue losses would not be realized within a five-year period. However, these gains could more than offset revenue losses within a decade.

The Board recognizes that by lowering the cost of building facilities intended to manage solid and hazardous waste, reclassification of public-purpose bonds for environmental projects as tax-exempt governmental bonds may provide an incentive to increase polluting behavior. For the same reason, reclassification also may create a bias in favor of capital-intensive waste treatment or disposal technologies. The Board also recognizes that reclassification would not alleviate arbitrage rebate restrictions.

The Exclusion of Bonds that Finance Public-Purpose Environmental Facilities from State Volume Caps

Volume caps are dollar limits on the amount of tax-exempt, private-activity debt that can be issued in each state each year. Under current policy, once a state reaches its cap, the cost of private-activity bonds for environmental purposes increases. Additional bonds must be issued as taxable debt, or they are not issued at all.

Reclassifying environmental bonds as governmental bonds would exclude these bond issues from the pool of bonds under state volume caps. In the absence of reclassification, under the conditions described above, bonds used to finance public-purpose environmental facilities could be excluded from state volume caps. This more limited change in tax policy would avoid unintended limits on the ability of state and local governments to comply with federal environmental mandates at low cost.

Until 1986, volume caps generally did not constrain tax-exempt financing. Prior to 1986, the cap on industrial development bonds was $150 per capita or $200 million per state per year (whichever was greater). As a result of the 1986 Tax Reform Act, the cap on all private-activity bonds is now $50 per capita or $150 million per state per year (whichever is greater). Moreover, the non-governmental portion of a governmental bond in excess of $15 million -- along with mortgage revenue bonds (which previously had a separate cap) and other bonds (which previously had no cap) -- is now included in the calculation for the volume cap.

Benefits. Excluding bonds used to finance public-purpose environmental facilities from state volume caps would allow significantly more tax-exempt financing of environmental facilities than is currently allowable. Volume caps already have severely limited access to tax-exempt capital markets in several states. According to state officials in California, for example, demand for tax-exempt, private-activity debt exceeded the California cap by $270 million and $1 billion in 1988 and 1989, respectively.[21] California expects that, in 1990, demand will exceed the cap in that state by $1.4 billion. In Massachusetts, the debt demanded has hovered about 150 percent greater than the cap. In Texas and Illinois, demand has exceeded the cap every year since 1986. According to the Public Securities Association (PSA), which has recently completed a national study of volume caps, the number of states facing demand in excess of volume caps has increased each year since 1986. The PSA forecasts that, in 1990, states will hit their volume caps even earlier and exceed their caps by wider margins than in the past.[22]

According to the most recent analysis of the effects of volume caps on different types of bonds, volume caps in 1989 prevented some $2.4 billion in solid waste, hazardous waste, water, and sewer bonds from being issued as tax-exempt debt.[23] Most of the denied or delayed bond issues would have financed some $2.1 billion worth of solid waste facilities. Significantly, the principal reason for denying access to volume caps was not that total private-activity volume had exceeded the states' volume limitations. Rather, most bonds were denied because states had reserved a large proportion of their caps for other types of bond issues, such as mortgage revenue bonds. Many states that denied bonds for privately owned and operated environmental facilities had not used up their total allowable tax-exempt, private-activity debt limit at the end of the year.

Concerns. Perhaps the principal concern associated with the proposal to exclude bonds used to finance public-purpose environmental facilities from state volume caps is the potential cost to the U.S. Treasury. Relative to levels of tax-exempt debt issued under the current volume cap restrictions, tax revenues accruing to the U.S. Treasury would decline to the extent that additional tax-exempt debt is issued. Tax revenue losses associated with this proposal could reach $932 million between 1991 and 1995 using the Treasury model for computation.

Elimination of the Costs of Issuance Restrictions on Tax-Exempt, Private-Activity Bonds that Finance Environmental Facilities

Many analyses and reports issued since the 1986 Tax Reform Act have noted that restrictions on the cost of issuing bonds places an unnecessary limitation on issuers.[24] For tax-exempt, private-activity bonds, the Act stipulates that no more than 2 percent of the total value of the bond issue can be used to pay the cost of the issue.

In a 1988 study, the U.S. General Accounting Office (GAO) found issuance costs higher than 2 percent of proceeds.[25] GAO found that these costs averaged 3.5 percent in 1985 and 3.4 percent in 1986. These costs, calculated as a percentage of total costs, tended to be larger for the more common, smaller-value bond issues (see table below). The GAO report showed that the costs of water and sewer bond issues ranged between 2.7 percent and 2.9 percent of total bond proceeds. Based on this information, the current across-the-board 2-percent limit on the value of the bond issues that can be used to pay the cost of issues may be unduly restrictive, particularly with respect to bond issues of less than $25 million.

COSTS OF BOND ISSUES AS A PERCENTAGE OF PRIVATE-ACTIVITY BOND PROCEEDS (BY SIZE OF ISSUE)

Size of Issue	1985		1986[a]	
($ Millions)	Number of Issues	Average Issuance Cost as a Percent of Bond Proceeds	Number of Issues	Average Issuance Cost as a Percent of Bond Proceeds
$5 or less	9,068	3.4	1,476	3.4
5 - 10	1,471	4.0	152	3.7
10 - 25	1,173	4.1	64	3.6
25 - 50	557	3.2	43	2.4
50 - 75	181	2.7	15	2.4
More than $75	296	2.2	18	1.4
Total	12,747	3.5	1,768	3.4

[a]1986 data include only bonds issued before the effective date of the Tax Reform Act of 1986.

In fact, the 2-percent limit may be ineffective. If they are able, state and local issuers pay whatever costs of bond issues that the market dictates. If costs are in excess of 2 percent, issuers must raise funds outside the tax-exempt bond transaction. In some cases, issuers can take funds from operating budgets or from supplementary taxable bond issues, for example. In others,

issuers may be unable to raise the needed funds. Using alternative funds to cover issuance costs raises the overall cost of financing environmental facilities -- by 15 to 20 percent, according to some estimates -- and can produce inefficiencies.[26]

Reclassification of environmental bonds as governmental bonds would lift the 2-percent limit on the value of a bond issue that can be used to pay the cost of the issue. In the absence of reclassification, however, a simple alternative would be to lift this limit on environmental bonds.

Benefits. Lifting this limit would benefit all involved with bond-financed projects by incorporating all the costs of financing -- including the costs of bond issues -- into the bond transaction. To secure the real costs of issuance from sources outside the bond transaction is less efficient and more costly.

Concerns. On the surface, it might appear that lifting the 2-percent limit confers special benefits on the parties to a bond transaction, such as underwriters or financial advisors. Yet the evidence suggests that the market for these services is highly competitive, which in turn, will tend to hold transaction costs to reasonable levels. Hence, lifting the 2 percent restriction is unlikely to result in significantly changed transaction costs. These costs of bringing a bond to market would simply be shifted from sources outside the bond transaction to the bond proceeds themselves.

Exemption of Interest on Public-Purpose Environmental Bonds from the Alternative Minimum Tax

Interest income derived from tax-exempt, private-activity debt is classified as a preference item for the purposes of calculating the alternative minimum tax payable by individuals and corporations. This tax was created by the Tax Reform Act of 1986 to ensure that all individuals and corporations contribute some minimum share of income as taxes. With the addition of the alternative minimum tax, taxpayers must calculate their tax liability in two ways. They must first calculate their ordinary tax liability. Then they must calculate their taxable income subject to the alternative minimum tax. This income includes ordinary taxable income as well as certain other income, including preference items, such as the earnings on private-activity bonds. The alternative minimum tax rate is 20 percent for corporations and 21 percent for individuals. The taxpayer must pay whichever liability is greater: ordinary tax or the alternative minimum tax.[27] Hence, even if private-activity bonds are tax-exempt, taxpayers may still have to pay taxes on earnings from these bonds if their alternative minimum tax exceeds their ordinary tax.

In the absence of reclassification of environmental bonds as governmental bonds, the dual goals of tax reform and environmental compliance would be served if interest earned on bonds issued to finance public-purpose environmental facilities was no longer included as a tax preference item for purposes of calculating the alternative minimum tax on personal and corporate tax returns.

Benefits. Exempting interest on public-purpose environmental bonds from the alternative minimum tax would reduce the cost of issuing tax-exempt bonds for environmental facilities.

According to various sources, the possible applicability of the alternative minimum tax to bond issues increases the cost of bond issues by 15 to 30 basis points.[28] This is a considerable sum. In dollar terms, a 25-basis-point differential in interest rates on a $100 million bond issue would cost the issuer about $4 million over a 20-year period -- $4 million that could otherwise fund other important needs.

Concerns. The principal concern associated with the proposal to exempt interest on public-purpose environmental bond issues from the alternative minimum tax might be the potential for losses of tax revenue, as calculated by the U.S. Treasury Department. However, according to the Public Securities Association (PSA), the federal treasury is capturing little or no income from the current alternative minimum tax paid on interest from these bond issues because investors subject to the tax withdraw their demand. At higher costs to the states and localities that issue them, these bond issues are placed with investors not exposed to the alternative minimum tax. The net effect, according to the PSA, has been an increase in costs to bond issuers and a limiting of the investors attracted to these issues without a commensurate benefit to the federal government.[29] If this is true, then tax losses associated with this proposal would be minimal.

Allowance for Advance Refundings of Tax-Exempt, Private-Activity Bonds Used to Finance Environmental Facilities

Prior to 1986, bonds to refund governmental (and 501(c)(3)) bonds could be issued well in advance of the redemption date of the original bond, and proceeds on the refunding bond could be held in interest-bearing accounts until the original bond could be retired. This provision allowed bond issuers to take advantage of favorable market conditions to reduce the cost of debt, without the tax-exempt status of interest on the refunding bonds being affected. Before 1986, industrial development bonds (pre-1986 equivalents of private-activity bonds) could not be refunded until 180 days prior to redemption.

The 1986 Tax Reform Act shortened the time period for advance refunding to 90 days prior to redemption. Governmental or 501(c)(3) bonds issued after December 31, 1985 could be refunded in advance, only once, otherwise interest on refunding bonds would no longer be tax-exempt. (Bonds issued before that date could be advance refunded twice.) In addition, the Act prohibited advance refundings for all private-activity bonds other than qualified 501(c)(3) bonds. Other restrictions also were imposed. For example, the Act required that refunded bonds be retired no later than the first allowable redemption date, if refunding would produce debt service savings.

In the absence of reclassification, one way to place public-purpose environmental facility bonds on a par with governmental bonds would be to allow them one advance refunding on a tax-exempt basis.

Benefits. Allowing one tax-exempt advance refunding would provide state and local bond issuers much needed flexibility to refinance outstanding bonds at favorable rates. While the exact dollar savings would vary according to the spreads between the rates on outstanding bonds and

current market rates, the net effect would be considerable savings on the cost of financing environmental facilities.

Concerns. A one-time tax-exempt advance refunding could reopen the possibility of tax abuse and expose the federal government to tax revenue losses. Congress has noted that some bond issuers had taken advantage of advance refunding by refunding, but not retiring, outstanding bonds at virtually no cost or risk. Issuers had been able to do this by investing the proceeds of an advance refunding in federal securities at a guaranteed yield equal to that of the refunding issue.[30] As a result, multiple issues of bonds would be outstanding at the same time. From the perspective of the U.S. Treasury, this resulted in losses of federal tax revenues. For example, if bonds for a single $10 million sewage project were refunded in advance three times, the federal government could incur tax revenue losses equivalent to $30 million worth of tax-exempt bonds.

Allowing only one tax-free advance refunding of public-purpose bonds used to finance environmental facilities in compliance with federal environmental mandates would help limit potential federal tax revenue losses.

Allowance for Reinvestment of Arbitrage Earnings for Environmental Bonds

Arbitrage earnings include earnings from bond proceeds invested at rates above the bond yield. Arbitrage earnings can accrue after bond proceeds are collected from the bond sale and before construction expenses must be paid. Under the 1986 Tax Reform Act, arbitrage earnings must be rebated to the U.S. Treasury.

The 1989 budget reconciliation bill (H.R. 3299) gave partial relief from the rebate requirements. However, the bill allows bond issuers to invest bond proceeds without rebating arbitrage earnings, provided that the proceeds are spent in accordance with a two-year schedule. However, the Board has found that most environmental projects take longer than two years to build.[31] In a recent review, for example, EPA found that the average time to construct a typical wastewater treatment plant was slightly over four years.[32] Other environmental facilities require similar construction periods. These periods require issuers of environmental debt to structure many smaller sequential bond issues to avoid the rebate penalties. Bringing many small bonds to market, however, incurs significantly higher fixed-issuance costs per dollar of proceeds than does a single large issue. It also may have the effect of forcing states and localities to issue bonds in unfavorable market conditions.

State and local costs of financing environmental facilities could be reduced at low federal costs by enabling issuers of tax-exempt environmental bonds to earn interest on bond proceeds without penalty over a reasonable period of time for construction of environmental facilities. This provision would apply only if the excess interest earnings (earnings above the bond yield) are used exclusively to reduce the size of the bond issue.

Benefits. Current arbitrage rebate provisions displace dollars from state and local budgets that could otherwise be used to downsize bond issues and reduce the overall cost of environmental facilities. However, the proposal to enable issuers of tax-exempt environmental bonds to earn interest on bond proceeds without penalty over a reasonable facility-construction

period would reduce the cost of financing public-purpose environmental facilities. For example, consider a $50 million project completed in four equal stages of one year each. Under current arbitrage rebate provisions, earnings from bond proceeds invested at one-half a percentage point above the bond's interest rate -- nearly $338,000 over the four-year construction period -- would have to be rebated to the U.S. Treasury. If Congress changed rebate provisions to allow bond issuers to keep arbitrage earnings gained during the period of construction, those earnings could be used to reduce the overall project cost.

Concerns. Like the other proposals described above, this proposal to allow bond issuers to keep arbitrage earnings gained during the period that an environmental facility is being constructed has the potential to reduce federal revenues. This reduction would occur to the extent that current arbitrage rebate provisions are earning the U.S. Treasury such revenues.

IV. USING ECONOMIC INCENTIVES TO PREVENT POLLUTION

One response to an insufficient number of environmental facilities operating at sufficient capacity is to spend more to build new facilities and to expand existing ones. Another response is to lower the demand for environmental services by reducing the generation of garbage, using less drinking water, and dumping fewer toxins down the drain. If waste reduction and resource conservation activities cost less than waste management, pollution prevention will reduce the cost of national environmental programs.

Experts point to many policies that could prevent pollution. These policies range from greater information transfer and technical assistance to creation of regulatory mandates and economic incentives. Clearly dissemination of information is important. In fact, one of the principal impediments to pollution prevention, especially for small generators, is lack of guidance on just what to do.[33] For larger manufacturers, EPA's new program of corporate volunteerism appears promising, both because results are highly probable and because the program requires virtually no government intervention.[34] In essence, the Administrator has announced to major producers his intent not to regulate pollution prevention, but to ask for volunteers to demonstrate that a 33 percent reduction of 17 high-priority toxic pollutants is achievable by 1992 and that a 50 percent reduction is achievable by 1995.

The Board strongly endorses voluntary pollution prevention. It agrees with recent EPA and other reports that conclude that designing and implementing regulations for thousands of different situations in which pollutants are produced is inefficient and impractical. In a 1986 report to Congress on waste minimization, for example, EPA pointed to the technological and administrative problems of regulating waste reduction.[35] According to the EPA, there are too many situations for which to set standards, and the rules setting these standards would be difficult to enforce.

In keeping with the principles of the Administrator's corporate volunteerism strategy and recognizing the impracticality of regulating pollution prevention, the Board believes that economic incentives should be used as they are effective and efficient ways to reduce pollution. At this time, the Board is not prepared to make formal recommendations on the use of economic incentives. However, this Advisory presents an array of proposals for the use of economic incentives, evaluates how effective they might be in reducing pollution, and outlines the concerns generally associated with each proposal.

In a subsequent Advisory, the Board intends to analyze thoroughly the opportunities to supplement traditional technology-based effluent regulations with market-based alternatives.

A. STATEMENT OF THE ISSUE

The United States has not taken full advantage of opportunities to reduce the cost of environmental protection by reducing the generation of pollutants. Recently, a great deal of attention has been focused on reducing the nation's hazardous waste stream from industrial processes. Many analysts now suggest that a 50 percent reduction is economically and

technologically feasible over the next few years.[36] Both economic incentives (tax subsidies, grants, awards) and economic disincentives (effluent or emission fees, fines) have been tried -- with varying degrees of success -- to promote industrial waste reduction. One example of an economic disincentive is a tax of $25 on each ton of pollutant emissions from industrial facilities. This tax, levied under the 1990 Clean Air Act Amendments, is expected to have the effect of reducing emissions at facilities that have emission control costs lower than the tax they would pay on emissions. In comparison, relatively few economic incentives target reduced solid waste generation or reduced demand for drinking water or wastewater treatment.[37]

B. DISCUSSION

In the Board's opinion, opportunities to complement traditional pollution control programs with economically motivated pollution prevention will be available in the 1990s. These opportunities will arise within the next five years when nearly all the major federal environmental statutes will be reauthorized.[38]

Recent EPA reports that have reviewed the last 20 years of environmental progress have made two fundamental observations.[39] First, these reports suggest that the environmental control strategies of the 1970s and 1980s have worked insofar as they have resulted in the removal of significant amounts of largely conventional pollutants from point sources. Yet, they also noted that the removal of these pollutants was easier and much less expensive to accomplish than meeting the environmental challenges of the 1990s and beyond will be. These challenges include controlling non-point sources of pollution such as agriculture, reducing the discharge of toxic contaminants from all sources into all environmental media, and restoring the health of natural and living resources.

One recent EPA report noted that command-and-control regulations that impose technology-based standards were more suited to the environmental concerns of the 1970s than to those of the 1990s and beyond.[40] This Advisory argues that to maintain progress on the environmental front, EPA must move beyond the prescriptive approach by introducing innovative policy instruments such as economic incentives. Because economic incentives influence rather than dictate action, consumers and businesses can make their own choices about how to achieve stated levels of environmental quality. Presumably these choices will reflect a bias toward least-cost actions. Thus, properly designed, economic incentives can be used to harness the power of self-interest to work for the environment.

The Board has reviewed the following fundamental approaches to reducing pollution that merit the EPA's attention:

- Imposition of economic penalties, such as effluent fees, to reduce the volume or toxicity of discharges;
- Use of economic incentives, such as tax or other credits for investments in waste-reducing technologies or activities, to promote pollution prevention; and
- Removal of biases in current policies that inhibit waste reduction.

Reduce the Volume or Toxicity of Discharges to All Media Using Fees

Many European countries have adopted some form of environmentally based fees or "green taxes." Some measures tax inputs (feedstocks) to production processes, such as nitrates in agricultural fertilizers or virgin (non-recycled) packaging materials. Such fees encourage more efficient use of these inputs or substitution of other, less polluting, inputs such as recycled plastic or glass, for example.

Other measures tax outputs from production processes. Fees on outputs encourage waste reduction by making waste generation more expensive. For example, effluent fees encourage reductions in the volume or toxicity of pollutant discharges and deposits on containers are equivalent to waste fees when the containers are not recycled.

One kind of fee that has generated considerable interest is a fee on the handling of hazardous and solid wastes. Such a fee -- based on the volume and/or content of the waste being handled -- can be levied against waste producers, either directly or indirectly through tipping fees collected from waste haulers and charged back to generators. Materials handling fees, like effluent fees and waste fees, better reflect the true costs of waste management. They also discourage excessive use of materials that are difficult to dispose of safely. In addition, they can be used to generate funds to pay for the final disposition of those materials that cannot be recycled.

Materials handling fees have been introduced in a number of states. In 1982, the state of New York instituted materials handling fees to promote waste reuse and discourage the use of landfills. It began charging generators of hazardous wastes a fee of $12.00 for each ton of waste managed at landfills, a fee of $9.00 for each ton of waste treated or disposed of offsite (excluding landfills), and a fee of $2.00 for each ton of waste incinerated onsite.[41] In 1986, New Hampshire began charging all generators of hazardous waste a fee of 4 cents per kilogram of waste unless it was recycled. The state exempted recycled waste from fees. Some 30 other states now impose similar types of fees on inputs to typically waste-intensive industries or on the waste generated by industrial processes. In each of these states, waste generation has declined, as have fee revenues.

Benefits. The imposition of economic penalties in the form of fees would offer two benefits: raised revenues and reduced discharges. However, the exact cause and effect relationship between levels of pollution fees and expected reductions in discharges is not known. Similarly, the exact relationship between levels of fees and expected revenues is elusive, partly because if fees do their job, discharges, hence revenues, will decline over time. According to one estimate, if handling fees ranging from $5 per ton to $25 per ton (depending on toxicity) were assessed for hazardous wastes produced by industrial facilities, the industrial hazardous waste steam could be reduced by some 35 percent by 1995 with revenues totalling some $2.8 billion a year.[42]

Revenues from fees could be used to underwrite a variety of environmental activities, including complying with and enforcing environmental regulations and conducting research and development. Investing revenues in capital grants for waste reduction activities is especially

appealing, since some generators might rather reduce waste than generate it if they had access to low-cost capital with which to make waste reduction investments. Other waste reduction activities that are logical recipients of fee revenues include information dissemination, on-site waste reduction auditing, technology development, and research into modifying production process that are waste-intensive or substituting more environmentally benign production outputs for less environmentally benign ones.

Concerns. One of the principal concerns associated with the implementation of waste fees at the national level is the adequacy of systems to ensure equitable fee collection. First, there is some question about whether relevant data are or can be regularly collected. Systems for collecting data on solid waste generated at the producer and consumer levels are unavailable. Some states assess effluent fees on the basis of dischargers' reports, but these reports are not necessarily available nationwide. Air emissions data also are limited to estimates of criteria pollutants (non-toxics) with no internally consistent data on air toxics emissions. Second, there is some question about the proper units upon which fees should be based. In the interest of simplicity, some argue that all dischargers should pay a flat fee when they apply for a discharge permit. In the interest of affecting behavior, others argue that fees should increase as volumes or toxicity of discharges increase. Fees set too high, however, could result in illegal discharges or dumping.

Hazardous waste data may provide the best opportunity for deciding how to implement fees designed to reduce polluting behavior. Such data are available from two sources. Every two years, the EPA and the states collect data from waste management facilities and generators on the amounts and disposition of waste defined as hazardous under the Resource Conservation and Recovery Act (RCRA). The Toxics Release Inventory, compiled as a result of the 1986 Superfund Amendments, records all releases of a broader group of toxic constituents, but only by the manufacturing sector. Using either or both these data sets, a fee could be based on:

- The type of waste generated, with higher fees charged for more toxic substances such as PCBs;
- The waste management method used, with higher fees charged for less desirable disposal methods such as landfilling; or
- A combination of the type of waste generated and the waste management method used, with the highest fees charged for the least desirable combinations of waste generated and management method employed.

Some observers argue that fee-based approaches to waste management may generate revenue but still fail to achieve significant reductions in the amount of pollution generated if fees are set too low. Even so, revenue from fees could be used to finance remedial infrastructure to manage waste and meet related environmental needs.

Other observers are concerned about the potential economic and social side effects of waste fees if they are set high enough to have an impact on behavior. These fees can be regressive and bear hardest on individuals with low incomes. Analyses conducted by the Department of Energy indicate that a fuel tax of 25 cents per gallon could reduce the

consumption of motor fuel use by 4 to 5 percent, thus reducing pollution. However, such a tax would disproportionately affect low-income automobile users, since these users spend a much higher percentage of their income on gasoline than high-income automobile users.

The implementation of fee-based approaches to waste management raises other concerns as well. If waste fees are levied only within the United States or are higher than in other countries, U.S. firms could suffer a competitive disadvantage in the international marketplace. Production input costs would rise, either due to the fees themselves or to the incremental investment in alternative inputs and/or capital equipment that the fees would encourage. This outcome could adversely affect the country's balance of payments and, at the same time, increase unemployment in export-dependent sectors of the U.S. economy. Moreover, even within the United States, the effect of waste fees would not be evenly distributed. Depending on the type of tax or credit, some geographic or economic sectors would be affected more than others. For example, fees that discourage the use of fossil fuels will reduce economic activity in regions that depend on the extraction or processing of coal, oil, and gas for their economic livelihood.

Although fees levied at the consumer level can be regressive, they do not have to adversely affect U.S. exports, since they would be levied only if the good is consumed in the United States. Fees on consumption might also do much to control pollution and promote recycling of consumer goods, such as batteries, tires, used oil, and plastics.

Several other concerns are associated with fee-based approaches to waste management. These include the wisdom of implementing any kind of fee during a recessionary period; the relative efficiency and effectiveness of placing fees on waste generation or on toxic inputs to manufacturing processes; and the inability of polluters to finance waste reduction actions, despite the economic pressures of waste fees.

Use Tax Credits to Promote Waste Reduction

A tax credit, a type of economic incentive, is an alternative to a fee, a type of economic disincentive, for influencing waste generation behavior. Tax credits can change this behavior by altering the price of production inputs, such as fuels or capital equipment. Tax credits can be used directly to lower producers' net costs of purchasing and installing low- or no-discharge manufacturing equipment. They also can offset private costs of research on and development of processes or technologies that promote the reuse or recycling of wastes.

Tax credits offer a direct reduction in the recipient's tax liability and can be granted against income taxes, excise taxes, and property taxes. Like fees, they may be targeted at either the producer or the consumer and can have two outcomes: either they will result in waste reduction and an accompanying tax revenue loss, or they will have no effect on waste reduction.

Benefits. Theoretically, credits help overcome financial barriers to waste reduction. For example, tax credits for producers directly lower the cost of investing in waste reduction equipment or of undertaking research on and development of waste reduction.

In practice, however, tax credits for producers can be less effective than anticipated. In 1984, for example, Minnesota passed an income tax credit of 5 percent of the cost of equipment used primarily to reduce waste. It was never used, so the state repealed it in 1985 as part of an effort to simplify the tax code. If the credits had been refundable, tradeable, or carried over from year to year, producers might have taken advantage of them.

Concerns. The use of tax credits raises several concerns. First, although it is easy to track and verify investment in waste reduction equipment, the identification and approval of waste reduction technologies (and, to a lesser extent, products) for which producers and consumers are eligible to earn pollution prevention tax credits will require a reasonable administrative effort. Second, when tax credits are used, the cost of environmental improvement is borne by all taxpayers because claimed credits generally reduce tax revenues to the U.S. Treasury. By contrast, environmental fees are borne only by users and producers of the goods on which the fees are imposed.

Remove Bias in the U.S. Tax Code that Inhibits Waste Reduction

Lifting or amending restrictions in three areas of the U.S. Tax Code could remove barriers to and create incentives for waste reduction. Proposed changes focus entirely on the producer, as the relevant section of the code concerns corporate income tax.

The three areas of the tax code that act as barriers to waste reduction include limitations and restrictions regarding:

- deduction eligibility,
- depreciation of pollution control or pollution abatement equipment, and
- depreciation methods for extracted raw materials.

The Board recognizes that changes to the tax code are not necessarily an activity within EPA's jurisdiction. Yet it has concluded that the Agency could provide technical guidance to the Congress and to others, if asked, as these changes are debated. To the extent that these proposed changes are pursued, the Agency may wish to compare pollution prevention benefits with potential tax revenue losses.

The feasibility of changing the tax code raises similar concerns to those arising from implementing tax credits: what is the administrative burden, what types of new information are needed to establish eligibilities and exemptions, and who should be responsible for reporting and enforcing these provisions?

Deduction Eligibility. All deductions against income are, in theory, subject to the "public policy limitation." This limitation disallows any deduction that would "frustrate a sharply defined governmental policy."[43] In the case of waste management versus waste reduction, a strong argument can be posited that this limitation has been weakened or rendered obsolete. According to Sections 162 and 167/8 of the U.S. Tax Code, for example, capital assets such as plant and

equipment that discharge solid wastes, effluents, or emissions in violation of discharge permits may be depreciated. Deductions also may be claimed for expenses arising from payment of punitive damages in connection with environmental malfeasance. Payments in connection with illegal acts (illegal waste disposal, for example) also may be deducted. These allowances thus act to encourage unsound waste management practices and almost certainly encourage waste management over pollution prevention.

If EPA wished to oppose the above deductions, it could make a policy statement to the effect that pollution prevention should supplant waste management where technologically feasible and economically efficient. This would establish a "sharply defined government policy" which the above deductions could be seen to frustrate. If these deductions could then be explicitly disallowed, they could be replaced with deductions for investments in plant and equipment (or process changes) that prevented the generation of waste.

Depreciation of Pollution Control Plant and Equipment. Under Section 169 of the U.S. Tax Code, plant and equipment used to control pollution can be depreciated over a 5-year schedule, subject to certain conditions. The code requires, however, that these assets not increase profitability (by reducing operating costs, for example), not increase capacity either, or extend plant life. In addition, the cost of pollution control plant and equipment cannot be repaid by the recovery of wastes. This means that the value of the recovered material cannot equal or exceed the annualized cost of the plant and equipment. Finally, the tax code requires that pollution control plant and equipment be state or federally approved as conforming with prescribed standards. If a plant's life exceeds 15 years, the write-off is reduced proportionately -- for example, only half the cost of the plant can be rapidly amortized if the life of the plant is double the maximum allowed. However, the limit on allowable plant life does not apply if the investment in the plant might have occurred anyway, and is only applicable to plants in operation prior to 1976.

One of the major problems with the provision of depreciation of pollution control plant and equipment under the U.S. Tax Code is that it encourages end-of-pipe waste management over pollution prevention. For example, Section 169 of the code does not allow depreciation of investments that add value to a plant by reducing costs or extending plant life, both of which are benefits of pollution prevention. Compared to an investment in waste management plant and equipment, which is eligible for rapid depreciation, an investment in a production process or a piece of equipment to reduce pollution is ineligible for depreciation under Section 169 and hence receives no tax subsidy. What Section 169 does not do, precisely because it limits the deduction to plant and equipment that offer no other benefit than pollution control, is to make pollution control (not pollution reduction) a major issue in corporate investment decisions.

Section 169 could be far more effective if it made pollution reduction part and parcel of the necessary and continuous assessment of investment opportunities that will improve corporate performance. To promote waste reduction, allowable depreciation under Section 169 could be limited to plant and equipment that reduce waste instead of restricted to plant and equipment that merely control pollution. (In other words, investments in plant and equipment that just control pollution would no longer be eligible for depreciation, but investments in plant and equipment that reduce waste would be.) In addition, accelerated depreciation schedules could be shortened on the basis of the quantity of waste reduced as a result of investments in plant and equipment.

This would mean that the greater the waste reduction is, the shorter the depreciation schedule would be.

One problem with lifting the restriction on allowable depreciation -- either to investments in plant and equipment that reduce pollution or to investments in plant and equipment that merely control pollution -- is that it could invite exploitation in the form of "sham" pollution prevention investments. It should be noted, however, that exploitation is just as likely under the current Section 169 credit.

Despite the possibility that lifting the current (or proposed) restriction on allowable depreciation could invite exploitation, it could be argued that the restriction should be lifted because it violates the intent of the Investment Tax Credit. This credit was established to increase capital spending in general, but the restriction on allowable depreciation discourages investment in plant and equipment that reduce pollution. At a minimum, Section 169 could be modified to provide an incentive to increase capital spending on plant and equipment that reduce pollution, regardless of any other benefits an investor would receive. Such a modification would be in keeping with the intent of the Investment Tax Credit.

If Section 169 was restructured to confer tax benefits on investments in pollution reduction, the value of those benefits could be increased by lifting some of the restrictions that limit the value of the tax benefits. These include allowing accelerated depreciation for equipment put in place after, not prior to, 1976; lifting the limit of a 15-year plant life to qualify for full Section 169 benefits; and allowing corporations to claim 100 percent of the cost of their investments in plant and equipment, as opposed to the 80 percent they now can claim. These changes would impose new, but manageable, administrative burdens such as the reporting of pollution reduction equipment purchased, and deductions can take place on corporate income tax returns.

The chief argument against allowing Section 169 to confer tax benefits on investments in plant and equipment that satisfy pollution reduction criteria is that it would not raise revenues. Yet raising revenue is the priority of tax policy. However, amending Section 169 as outlined above would induce companies to make investments they might otherwise not make, and these investments would increase corporate profits enough to raise tax revenue. At worst, the above described changes to Section 169 would be revenue neutral -- that is, they would neither raise nor lower revenues.

Depreciation Methods for Extracted Raw Materials. An incentive for reducing hazardous waste could be realized by eliminating depletion allowances for toxic minerals under certain conditions and by changing the method of depreciating toxic mineral resources. Currently, the U.S. Tax Code allots depletion allowances for extracted raw materials such as minerals on a percentage basis. Under percentage depletion, the annual depreciation charge on an extracted raw material equals a fixed percentage of sales of the raw material divided by the expected life of the material. (In the case of minerals, life is measured in barrels of oil, tons of coal, and so on.) When the market price of the raw material rises, the tax liability falls. Thus any price rise increases the rate of extraction. This is a particularly worrisome occurrence when the material for which the market price rises is a toxic mineral.

Some of the most toxic minerals enjoy the highest depletion allowance.[44] Eliminating these allowances for toxic minerals when a less toxic or a non-toxic substitute exists may discourage increased extraction of these minerals when their market prices rise. Moreover, in the absence of depletion allowances, users of toxic minerals would be encouraged to substitute non-toxic minerals for toxic ones or to substitute less toxic minerals for more toxic ones in many types of production processes.

Substitutions of non-toxic or less toxic inputs also could be encouraged by switching from a percentage depletion method for depreciating extracted raw materials to a cost depletion method. Under cost depletion, the annual depreciation charge equals the value paid for the raw material divided by the life of the material. This depreciation method may not discourage increased extraction when market prices for raw materials rise, but neither will the depreciation charge increase (as it does when depreciation is calculated on the basis of percentage depletion) as a result of those price rises. Alternatively, a percentage depletion allowance could be set on a sliding scale, with the lowest percentages of minerals sales associated with the most toxic minerals. This would directly raise the costs of extraction, again leading to the substitution of less toxic minerals for more toxic ones.

A switch to a cost depletion method for calculating depreciation charges or a percentage depletion allowance set on a sliding scale would lead to increased tax revenues. Whether or not these changes would lead to a lower extraction rate depends on the response of purchasers of products made with toxic minerals when they are faced with higher prices for these products. If a product made from non-toxic or less toxic materials can be substituted for a product made from toxic minerals and is available at a lower market cost than the product made from toxic minerals, demand for the product made from toxic minerals will decline and, along with it, extraction of the toxic minerals from which it was made.

NOTES

1. Office of Policy, Planning, and Evaluation, U.S. Environmental Protection Agency, *Environmental Investments: The Cost of a Clean Environment* (December 1990).

2. Office of Administration and Resources Management, U.S. Environmental Protection Agency, *A Preliminary Analysis of the Public Costs of Environmental Protection: 1981-2000* (May 1990).

3. See Paul R. Portney, ed., *Public Policies for Environmental Protection* (Washington, D.C.: Resources for the Future, 1990).

4. Apogee Research, Inc., *America's Environmental Infrastructure: A Water and Wastewater Investment Study*, prepared for the Clean Water Coalition (December 1990).

5. All dollar figures in this section are expressed as 1988 dollars unless otherwise noted. For details on cost estimates, see OARM, U.S. EPA, *Public Costs of Environmental Protection.*

6. See National Council on Public Works Improvement, *The Nation's Public Works: Report on Wastewater Management*, prepared by Apogee Research, Inc. (May 1987).

7. Office of Water, U.S. Environmental Protection Agency, *State Funding Study: Details of State Needs, Funding, Funding Gap* (August 8, 1988). Trends in the study were extended from 1995 to the year 2000 to provide consistent data.

8. See OARM, U.S. EPA, *Public Costs of Environmental Protection;* and Office of Water, U.S. Environmental Protection Agency, *State Funding Study: Draft Recommendations* (1990).

9. The 1986 Tax Reform Act affected many public purposes; however, the Board's observations are limited to its effect on environmental investment.

10. Based on data from 1980 to 1990, the Board concludes that the 1986 Tax Reform Act has had little measurable effect on the volume of tax-exempt bonds issued for water, sewer, and solid waste management projects. It would appear that compliance with existing and new environmental regulations and replacement of old facilities are more important determinants of the overall rate of public investment in environmental facilities. The tax-exempt market for water and sewer bonds declined by 56 percent from 1977 to 1983, a drop from $5.9 billion to $2.6 billion in inflation-adjusted dollars. Since 1983, the market has rebounded, growing by 154 percent to an historical high of $6.6 billion in 1989.

11. The 1986 Tax Reform Act had different effects on the supply of tax-exempt bonds, on the availability of other tax-exempt investments, and on the demand for tax-exempt and taxable investments. On the demand side, the general reduction in marginal tax rates reduced the demand for tax-exempt investments of all kinds, including tax-exempt bonds. All things being equal, this reduction in demand would tend to increase interest rates to

attract buyers. At the same time, however, the Act also reduced the supply of tax-exempt bonds and eliminated the tax benefits of some alternative investments, such as real estate. This reduction in supply would decrease interest rates, as bond issuers would have to offer less return to attract buyers. On balance, these two effects seem likely to offset each other.

12. Dennis Zimmerman, *The Volume Cap for Tax-Exempt Private-Activity Bonds: The State and Local Experience in 1989* (Washington, D.C.: U.S. Advisory Commission on Intergovernmental Relations, July 1990).

13. See Margaret C. Henry, "The 102nd Congress and Tax-Exempt Bonds: A Professional's Look Into the Crystal Ball," *The Bond Buyer*, 7 January 1991.

14. Anthony Commission on Public Finance, *Preserving the Federal-State-Local Partnership: The Role of Tax-Exempt Financing* (October 1989).

15. Prior to the 1986 Tax Reform Act, the category for tax-exempt debt comparable to private-activity bonds was the industrial development bond. Debt obligations of nonprofit 501 (c)(3) organizations are considered private-activity bonds, but are exempted from the many restrictions of private-activity debt, such as the volume cap, the prohibition against advance refundings, and the alternative minimum tax.

16. Trend line data on private-activity issues has shown that the interest costs for private-activity debt are 25 to 30 basis points (roughly one quarter of 1 percent) higher than comparable governmental debt. See testimony of Ralph Horn (on behalf of the Public Securities Association) on H.R. 1761 before the Subcommittee on Select Revenue Measures, House Committee on Ways and Means, 8 June 1989.

17. See Paul R. McDaniel, "Tax Expenditures as Tools of Local Governments," in *Beyond Privatization: The Tools of Government in Action*, ed. Lester M. Salamon (Washington, D.C.: The Urban Institute Press, 1989).

18. See Senate Budget Committee, *Tax Expenditures: Relationships to Government Spending Programs and Background Material on Individual Provisions*, 97th Cong., 2nd sess., 1982.

19. For complete details of the methods, model, assumptions, and data used to generate this estimate of tax revenue losses, see Apogee Research, Inc., "Estimating Tax Expenditures Associated with EFAB Tax Policy Alternatives," a memorandum prepared for the Office of the Comptroller, Resource Management Division, U.S. Environmental Protection Agency (24 October 1990).

20. Larry E. Huckins, "Tax Exemption of Municipal Bond Interest: Revenue and Resource Allocation Effects," in *Federal-State-Local Fiscal Relations, Technical Papers*, vol. 1, prepared for the Office of State and Local Finance, U.S. Department of the Treasury (September 1986), 313-48; and Eric Toder and Thomas Neubig, "Revenue Estimates of Tax Expenditures: The Case of Tax-Exempt Bonds," *National Tax Journal* 38 (September 1985): 395-414.

21. Personal communication with Cheryl Eckerd, Trust Services Division, California State Treasurer's Office on 2 February 1990.

22. Personal communication with P. Anders Nybo, Public Securities Association, New York, N.Y, on 20 February 1990.

23. See note 6.

24. See Anthony Commission, *The Role of Tax-Exempt Financing;* and *Final Report of the Private Sector Advisory Panel on Infrastructure Financing*, a report to the U.S. Senate Committee on the Budget (1986).

25. U.S. General Accounting Office, *Tax Policy: Tax-Exempt Bond Issuance Costs*, GAO/GGD-90-9BR (1988), 18-20.

26. Personal communication with Cathy Spain, Government Finance Officers Association, on 18 June 1990.

27. See testimony of Ralph Horn on H.R. 1761.

28. See testimony of David M. Thompson (on behalf of the Public Securities Association) before the House Committee on Ways and Means, 5 March 1990.

29. See testimony of David M. Thompson before the House Committee on Ways and Means.

30. House Committee on Ways and Means, H. Rept. 99-426, 7 December 1985.

31. The bill specified the following spend-down profile: at least 10 percent of bond proceeds must be spent within the first 6 months, 45 percent by the end of 12 months, 75 percent within 18 months, and 100 percent within 24 months. The bill does permit 5 percent of the bond proceeds to be held over and disbursed in the third year, but only if it is for "reasonable retainage."

32. See *Analysis of Mean Time Intervals Construction Start to Initiation of Operation: Construction Grants Projects 1972-1990*, prepared by Don Rugh, Policy and Analysis Branch, Office of Municipal Pollution Control, U.S. Environmental Protection Agency (27 March 1990). This figure was derived by weighing the national mean construction time interval for each eligible cost class by its dollar share in total eligible costs. If mean construction time for each cost class is weighted by the number of projects rather than dollar value (thus biasing the outcome in favor of smaller but more numerous projects), the mean construction time interval is still greater than two years (2.5 years). It is unclear what, if any, bias has been introduced into the Rugh analysis because the projects used to determine construction times were funded under Title II of the Clean Water Act. Many projects funded without such grants are completed faster.

33. See Kenneth I. Rubin, "Factors That Motivate Industrial Waste Management Decisions," prepared for the Conference on Industrial Hazardous Waste Treatment and Waste Reduction held at the University of Tennessee in February 1987; and Apogee Research,

Inc., *The Nation's Public Works: Report on Hazardous Waste Management*, prepared for the National Council on Public Works Improvement (May 1987).

34. Pollution Prevention Division and Office of Toxic Substances, U.S. Environmental Protection Agency, "Industrial Toxics Project, 1988 Toxics Release Inventory, National Profile of Target Chemicals" (13 December 1990).

35. U.S. Environmental Protection Agency, *Report to Congress: Minimization of Hazardous Waste* (October 1986).

36. See Office of Technology Assessment, U.S. Congress, *Serious Reduction of Hazardous Waste* (September 1986).

37. One notable exception is a program now under development by the Metropolitan Water District (MWD) of Southern California--a water wholesaler. MWD offers credits against water charges to all of its retailers--many of the cities in Southern California--if they can show that water conservation programs have resulted in reductions in demand.

38. The Clean Water Act, the Resource Conservation and Recovery Act, and the Safe Drinking Water Act are up for reauthorization in 1991; Superfund will be reauthorized as early as 1992.

39. Office of Administration and Resources Management, U.S. Environmental Protection Agency, *Paying for Progress: Perspectives on Financing Environmental Protection* (Fall 1990); and Science Advisory Board, U.S. Environmental Protection Agency, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* (September 1990).

40. Office of Policy, Planning, and Evaluation, U.S. Environmental Protection Agency, *Economic Incentives: Options for Environmental Protection* (March 1991).

41. See testimony of Dr. Joel S. Hirshhorn, Office of Technology Assessment, before the Senate Committee on Environment and Public Works, 10 September 1984.

42. See Apogee Research, Inc., *Projections of Demand for Hazardous Waste Management Capacity in Alaska, Idaho, Oregon, and Washington: 1989, 1995, and 2009*, prepared for the U.S. Environmental Protection Agency, Region X (October 1989).

43. R. A. Westin and S. E. Gaines, "The Relationship of Federal Income Taxes to Toxic Wastes: A Selective Study," *Boston College Environmental Affairs Law Review* 16, no. 4 (1989): 759.

44. The average rate for all minerals is 12.1 percent; but it is 22 percent for asbestos, uranium, lead, and mercury.

APPENDIX

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