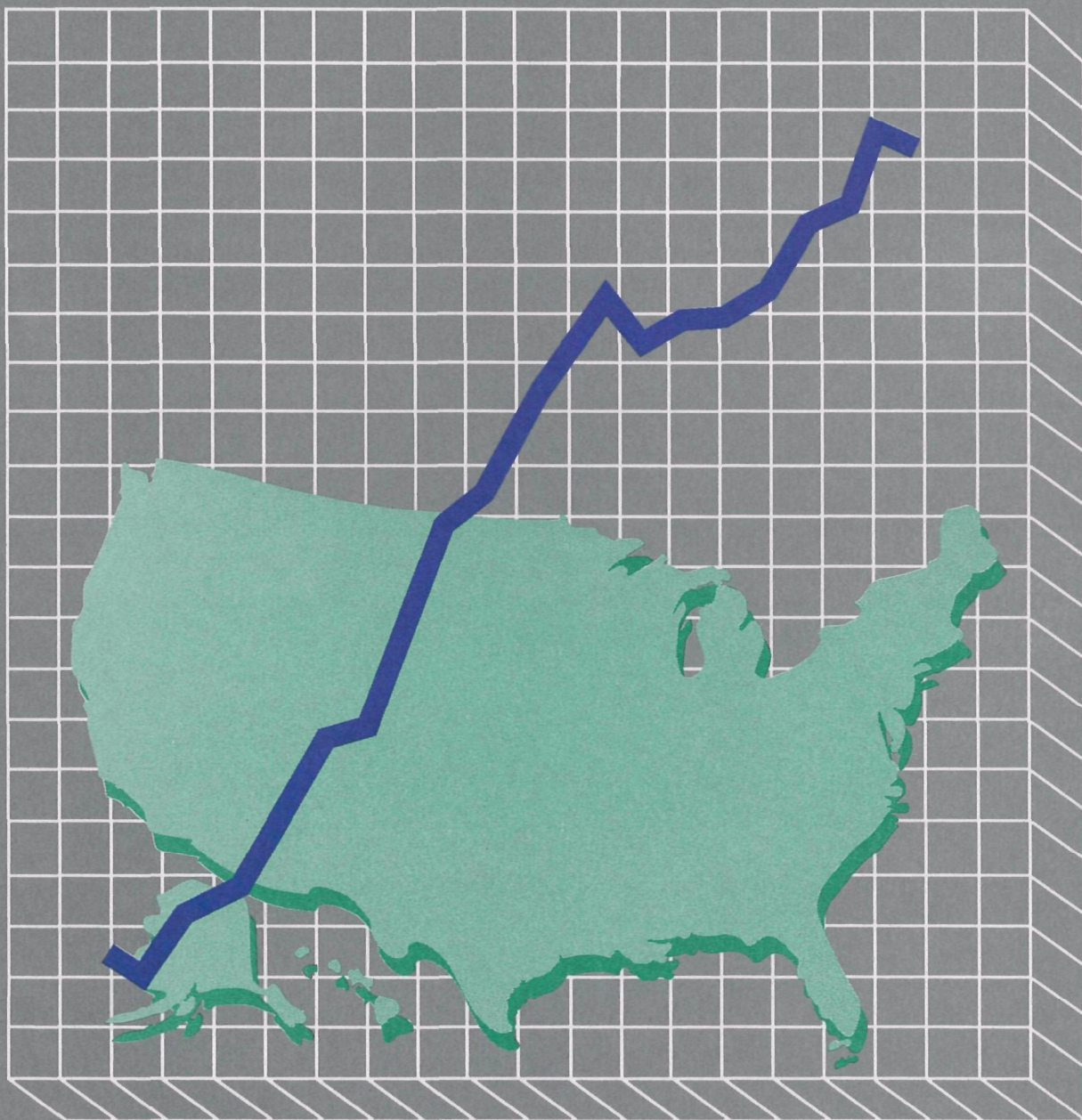




A Preliminary Analysis of the Public Costs of Environmental Protection: 1981 - 2000



A Preliminary Analysis of the Public Costs of Environmental Protection: 1981-2000.

Assistant Administrator's Foreword

Not long ago, America was facing a crisis. Our skies were clouded with black industrial smoke, our waterways fouled by wastes and chemical residue, our land defaced by uncontrolled litter, and our wildlife and drinking water poisoned by harmful pesticides. Slowly, Americans began to realize that the landscape and natural resources which sustain them were being degraded. The Environmental Protection Agency was created in 1970 to respond to this crisis.

Without a doubt, our nation has taken giant strides since then. We now enjoy healthier air and cleaner water in many places. These gains have come at a price. Government, industry, and individuals have spent hundreds of billions on environmental protection. And while our investment in facilities and equipment has been heavy, and there has been significant improvement in environmental conditions, our needs continue to grow. Widespread public support for environmental progress is prompting increases in services and facilities particularly at the local level.

Many factors exacerbate this situation. Fiscal constraints hamper government's ability to finance additional investments. Many environmental facilities need to be repaired, replaced, or modernized. Environmental demands are competing for public resources with other services such as education, health, fire, and police protection.

In the following report, EPA compares actual and projected public sector costs of complying with federal environmental regulations to financial resources currently available to federal, state, and local governments. The report examines actual costs between 1981 and 1987 and estimates costs to the year 2000. It is one of a series of EPA studies examining the financial impacts of environmental programs.

Perhaps the most important finding in this report is the projection of significant differences between the future cost of environmental services and the funds currently expended to provide them. The differences indicate that an important new environmental challenge is emerging.

This finding also indicates that traditional roles performed by the public sector to finance environmental services are changing. Society's failure to react to changes in government responsibilities and seek alternative technical and financial solutions may result in a shortage of resources necessary to meet all our needs. Just as this nation did twenty years ago, we must explore innovative solutions to a difficult problem. We need to tap the experience and expertise of all our sectors, not just in government, but also in the private sector. After all, everyone benefits from the conservation of natural resources.

As EPA prepares to celebrate its 20th anniversary, the Agency is taking time to reflect on what we have accomplished and what we must plan in the future. This report is part of our forward thinking. By analyzing past trends and estimating future patterns, *A Preliminary Analysis of the Public Costs of Environmental Protection: 1981-2000* identifies issues which require our attention now and well into the next decade.



Charles L. Grizzle

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Executive Summary

Since the early 1970s, the U.S. Environmental Protection Agency (EPA) has overseen a national mandate to restore and protect our water, land, and air resources. In this massive undertaking, EPA has relied heavily on state and local governments to help administer programs and to expend resources to comply with requirements. However, the expanded programs and tightened controls of the environmental legislation enacted in the 1980s challenge our ability to pay for future environmental needs.

Purpose of the Study

This study documents the costs of environmental protection for EPA, the states, and local governments and uses these data to:

- Examine differences between current expenditures and future costs of environmental protection;
- Assess trends in the distribution of costs among EPA, the states, and local governments;
- Identify the cost impact of environmental policies on local governments, capital markets, and households.

What Costs are Examined?

This report examines the public costs of environmental protection over the period 1981-1987 and projects them to the year 2000. These projections are estimates of the future costs of maintaining existing environmental standards, assuming the same level of quality as in 1987. In addition, the report examines the local costs of selected new environmental regulations and programs that local governments will bear in the future.

While investments in environmental quality yield substantial benefits, this report focuses solely on the costs of providing environmental services. For this reason, no attempt is made to place a value on such benefits as reduced incidence of disease and death, improved fishing and shellfish yields, expanded recreational opportunities, and strengthened local economies.

The report complements the work of the Municipal Sector Study recently completed by EPA.¹ The Sector Study examined the future costs of 22 new environmental regulations and their impacts on municipalities. Both studies will serve as building blocks for the Agency's upcoming "Cost of A Clean Environment" report.²

Overall Spending will Increase

In 1987, EPA, the states, and local governments spent about \$40 billion for environmental protection. If recent trends continue, they will need to spend approximately \$61 billion annually by the year 2000.

Spending trends reveal two potential cost gaps. The first, about \$15.6 billion a year by the year 2000, is the amount of EPA, state and local government spending needed, in addition to 1987 expenditures, to maintain 1987 levels of environmental quality. The second, \$5.3 billion a year by the year 2000, is the amount of local government spending needed to comply with selected new environmental regulations examined in this study.

Together these gaps represent a difference of nearly \$21 billion between what governments spent in 1987 and what we project they will need to spend by 2000 for environmental protection. The gap could narrow if we are more efficient in meeting environmental goals. However, these estimates are also conservative in that they do not include the costs to EPA and the states of new regulations, the costs associated with future Congressional mandates, and the growing number of new state and local environmental mandates.

EPA Expenditures will Decline

EPA expenditures are projected to decline by about one-third, from \$6.3 billion in 1981 to \$4.3 billion in 2000. EPA's share of spending on the environment is projected to drop from 13 percent to 8 percent between 1987 and 2000. This drop is due largely to the Congressionally mandated phasing-out of EPA grants to build wastewater treatment plants.

State Costs are Projected to Grow

Although relatively little is known about future state outlays for environmental programs, a recent EPA study projects that in 1995 the states will need an additional \$309 million to administer drinking water and wastewater programs. The study's analysis suggests that by the year 2000, the states will need to spend more than twice the amount spent in 1987 to administer water programs.³ State administrative costs could triple by 2000 if air and solid waste programs impose similar demands.

Local Share of Spending will Increase

Local spending is projected to increase significantly by the turn of the century. In 1981, local spending was about \$26 billion, or 76 percent of the public share of environmental costs. By the year 2000, localities are expected to spend over \$48 billion just to maintain 1987 levels of environmental quality and are projected to bear 87 percent of public costs for environmental protection.

Local Demands for Capital could Double (1981-2000)

A key issue in examining the impact of environmental spending on capital markets is the ability of local governments to support higher levels of capital formation. We project that annual local demands for capital to maintain current levels of environmental quality could double from about \$8 billion in 1981 to over \$16 billion in 2000. Additional demands for capital imposed by new regulations could add more than \$3 billion a year by 2000. Preliminary EPA analysis indicates that increased levels of capital formation may be difficult for many small and medium-size cities.⁴

Household Costs may Increase Dramatically

The annual cost of environmental programs for the average household is projected to increase by 54 percent from \$419 in 1987 to \$647 in 2000. Over the same period, however, household costs for small cities are expected to increase more dramatically. In cities with fewer than 500 people, costs could more than double, from \$670 in 1987 to \$1,580 in 2000.

The financial impact of environmental costs on households can be examined by measuring costs as a percentage of household income. The results show a significant impact on households in small cities (less than 500 population), for whom expenditures are expected to increase from 2.8 percent to 5.6 percent of household income between 1987 and 2000. On average, the impact is much less for households in all other city size categories, with projected increases of about 0.2 percent to 0.7 percent of household income by the year 2000.

Where do we go from here?

The growing costs of environmental protection require a re-examination of how the nation finances and pays for such investments. The difference between current and future needs and current spending clearly calls for more innovative approaches, especially at the local level. We need to take a fresh look at our requirements as well as the financing and management options available to meet them.

EPA has developed a number of new initiatives to help address these challenges. These include pollution prevention, public-private partnerships and other types of alternative financing, and technology development and transfer. The Agency has designed these initiatives to support state and local efforts to meet their environmental responsibilities. A theme common to these initiatives, is that they seek to involve and tap all available resources, both public and private in working to this goal.

Assumptions for Projections

The report projects expenditures to the year 2000. All cost figures in the report (past or projected) are presented in 1988 dollars unless otherwise noted.

Because of the long timeframe, uncertainties exist about what environmental regulations will be implemented and the cost of their implementation. Moreover, rules under development may change prior to final promulgation, resulting in costs different from the original projections. Because of these uncertainties, we made a number of assumptions about the future costs of existing and new regulations. Readers should keep the following assumptions in mind:

Existing Regulations

- Future costs were estimated by regressing five years of historical trends against time. Future costs were projected for each medium.⁵
- If historical data did not reveal a definitive trend, a flat spending pattern was projected based on the last year of actual data.
- Projections assume the current level of compliance. If compliance levels change, costs may be affected by changed levels of investment in pollution abatement and control.
- Estimated costs for drinking water and solid waste cover the delivery of services as well as assurance of quality. For example, drinking water costs include those to upgrade pipes and pumps as well as costs to meet regulatory requirements.

New Legislation

- Estimated local costs are derived from preliminary analysis for Regulatory Impact Analyses prepared for EPA program offices. (No comparable information is available on EPA and state costs for new regulations.)
- Demands for capital due to new regulations are shown in a lump sum in the year the capital will first be needed, or spread equally over a short timeframe. This assumption was made because of timing uncertainties associated with regulatory implementation and subsequent needs for capital.

Data collection, projections, analyses and graphical interpretations were conducted by Apogee Research Inc. Estimates of the costs of all new regulations were provided by the Environmental Law Institute. Editing, layout, and final preparation for printing this report were conducted by American Management Systems, Inc.

1 Overview: The Cost of • Environmental Protection

Since the early 1970s, the U.S. Environmental Protection Agency (EPA) has overseen the national mandate to restore and protect water, land, and air resources. Carrying out this mandate has proven expensive for all levels of government.

Faced with escalating environmental protection costs in competition with the fiscal pressures attributable to other public programs, governments may be limited in their ability to finance all the environmental protection activities anticipated by Congress. The largest problems lie with local governments that have low economies of scale in providing environmental services and limited ability to raise large amounts of capital.

Under Congress' statutory direction, the EPA has expended considerable resources to develop the components of broad national programs, including minimum national standards for environmental quality, permit systems, enforcement procedures, and remediation protocols. By offering grants and other forms of assistance, EPA has encouraged states to help implement our national programs. Most states, however, also have committed their own resources to administer the basic programs and others that reach beyond minimum federal standards. Despite federal and state grants to localities, local governments that provide drinking water, wastewater, and solid waste management services have contributed much of the cost to build capital facilities and almost all of the cost to operate and maintain them.

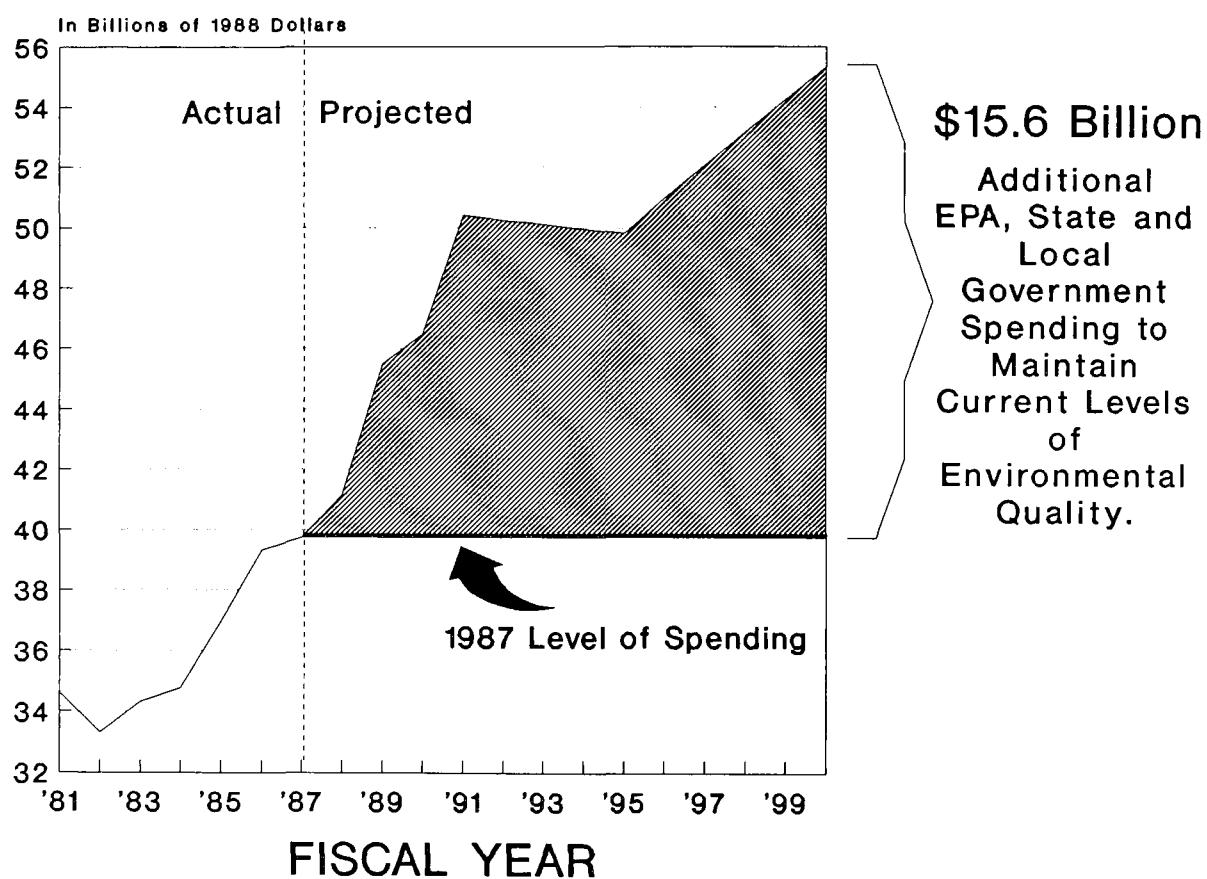
This chapter provides an overview of environmental expenditures from 1981 to 2000, both to maintain current levels of environmental quality and to meet standards associated with new regulations. Expenditures are examined by program and by sector.⁶

The Cost of Current Environmental Regulations and Services

In 1987, EPA, states, and local governments spent an estimated \$40 billion for environmental protection (see Figure 1). If recent trends continue, environmental expenditures by all levels of government are expected to increase to \$55.6 billion in the year 2000 just to maintain current levels of environmental quality. Extending current trends assumes, of course, that recent levels of compliance and rates of capital expansion and replacement remain steady throughout the projection period.

Figure 1

Public* Expenditures to Maintain Current (1987) Levels of Environmental Quality



* EPA, State and Local Government

Source: See Appendix 6

The capital portion of these expenditure estimates may be low if, as some experts argue, future spending will have to be higher to recover from the effects of deferred maintenance and rehabilitation. For this report, we assumed that rehabilitation and maintenance of capital plants would be undertaken at the same rate as in recent years.⁷ If spending for maintenance and rehabilitation has indeed been inadequate in the past, then incorporating the historical trend of capital outlays in the forecast of future costs embodies the assumption that the backlog of infrastructure rehabilitation needs will continue to grow. Capital expenditure estimates are particularly important for drinking water and water quality because of the large amount of capital plants associated with these services.

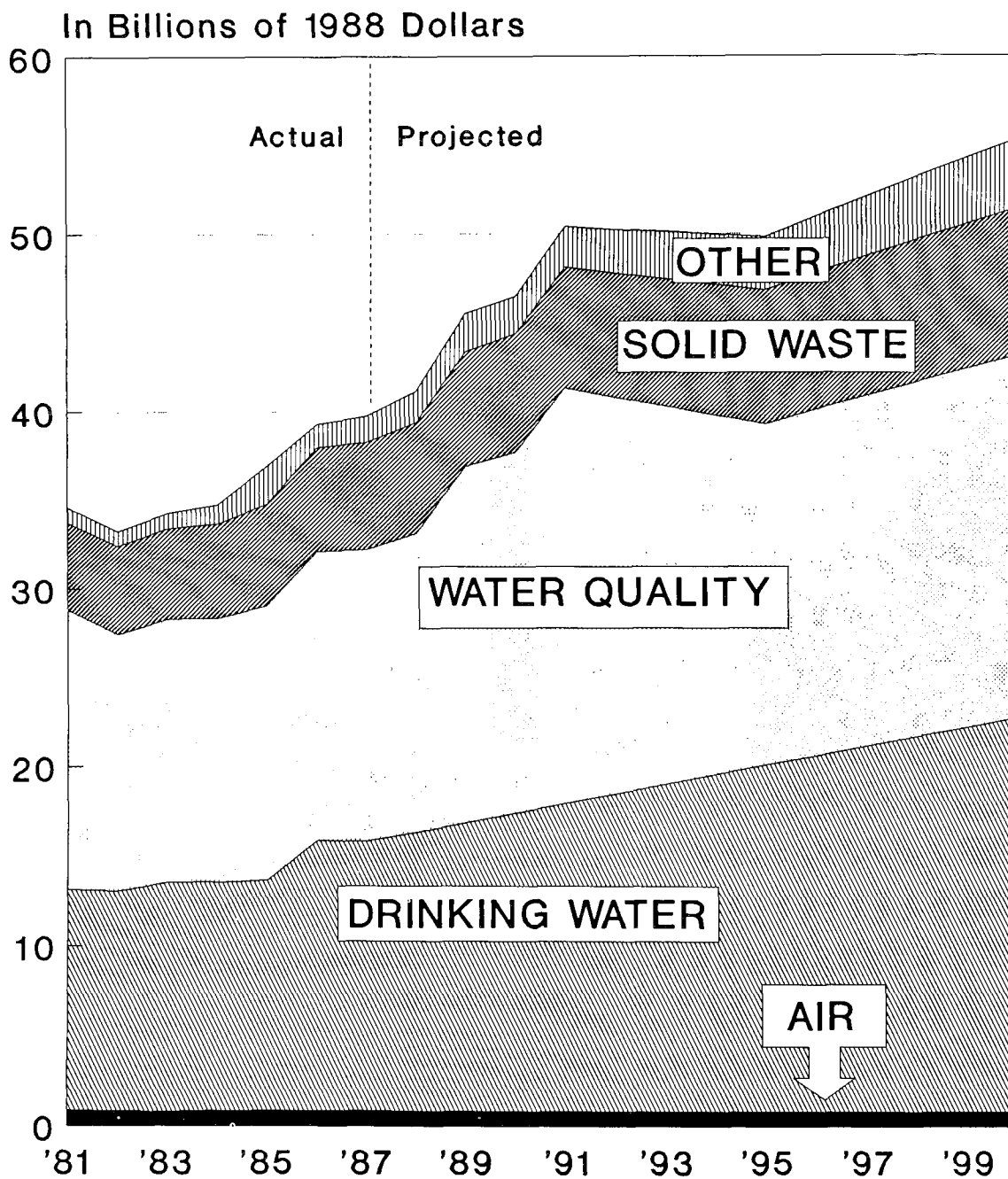
Expenditure Trends by Environmental Program

With the exception of the air quality program, expenditures to maintain current levels of environmental quality have steadily increased in the 1980s and are expected to continue to do so in the 1990s (see Figure 2).⁸ Rapid growth in spending for "other" environmental programs is attributable largely to steady increases in Superfund program activities.⁹ Spending in some programs, however, will increase more substantially than in others (see Figure 3). Spending for drinking water and solid waste programs will increase as a percentage of total spending; water quality expenditures will decrease as a percentage of the total.

Water Quality. In 1981, governments devoted roughly \$16 billion a year, or 46 percent of all environmental expenditures, to restore the quality of surface and ground water. Most of the \$16 billion was used to build and operate municipal wastewater treatment plants. In the 1990s, increases in national spending for water quality are not expected to keep pace with rates of growth in other environmental programs. Thus, compared to its 46 percent share in 1981, water quality expenditures could drop to a 36 percent share of environmental expenditures by the year 2000. Future water quality expenditures to maintain current levels of water quality will be dominated by the costs of building new or upgrading existing facilities to provide secondary treatment as required in the Clean Water Act (CWA). EPA estimated in 1988 that \$83.5 billion in capital expenditures would be required to bring all municipal wastewater treatment facilities into compliance with minimum national standards.¹⁰

Drinking Water. In 1981, \$12 billion, or 35 percent of all environmental expenditures, were spent on drinking water. These expenditures are expected to nearly double to \$22 billion a year by 2000 and to account for 40 percent of total environmental expenditures. Much of this increase is attributable to capital replacement and expansion.

Figure 2
Public* Expenditures to Maintain Current (1987)
Levels of Environmental Quality

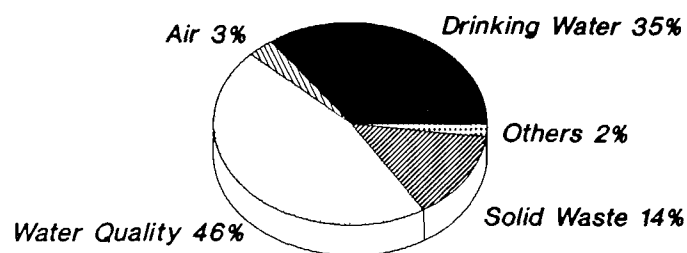


Source: See Appendix 6

* EPA, State and Local Government
Includes Costs to Deliver Services

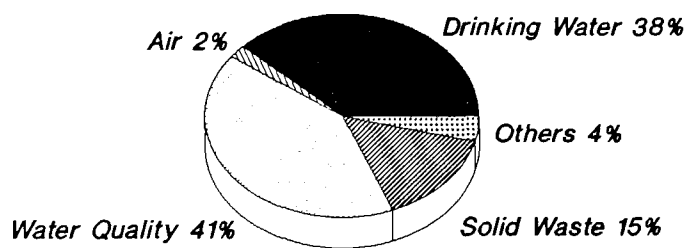
Figure 3

Distribution of Public* Expenditures to Maintain Current (1987) Levels of Environmental Quality



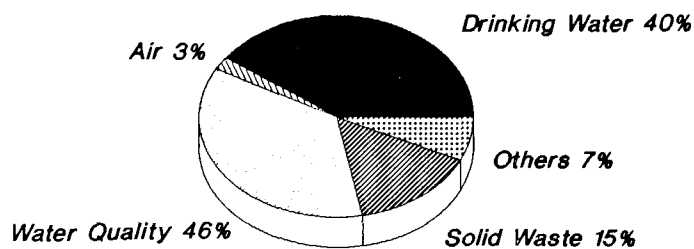
1981

\$35 Billion



1987

\$40 Billion



2000

\$55 Billion

* EPA, State and Local Governments in 1988 Dollars
Includes Costs to Deliver Services

Source: See Appendix 6

Solid Waste. Garbage collection and the construction and operation of solid waste management units (mostly landfills) accounted for \$5 billion to \$6 billion a year (or 14 percent of environmental expenditures by governments) in 1981. The low priority of solid waste management relative to other local environmental services is due, in part, to the shifting of resources from regulation of solid to hazardous waste, with passage of the Resource Conservation and Recovery Act of 1976 (RCRA). EPA was authorized in Subtitle D of RCRA to provide financial and technical assistance to the states and local governments to develop solid waste management plans. However, federal funds for Subtitle D were not appropriated after 1980.

Costs will escalate in the 1990s, so that by the year 2000, solid waste spending could account for 15 percent of environmental expenditures. It is likely that these estimates are conservative, given the extent of the solid waste disposal problem in the United States. Approximately 450,000 tons of waste are being generated every day, 80 percent of which are being disposed of in landfills that are rapidly reaching the end of their capacity.¹¹ Increased siting problems are leading to much higher disposal costs. It takes four to five years to implement plans for a sanitary landfill, and demand far exceeds supply of these facilities. On average, disposal costs in 1987 were four times the cost in 1977, having increased from \$3 or \$4 per ton in 1977 to \$20 or more in 1987. Waste-to-energy facilities and incinerators are increasingly favored by local governments for solid waste management. However, they are more expensive to build and operate, and face siting problems similar to those of landfills.

Air Quality. Government costs to administer air quality control programs accounted for 3% of all environmental expenditures in 1981. However, by the year 2000, solid waste expenditures are estimated to be four times those for air quality programs. In the absence of renewed programs or changes in recent rates of compliance, air quality spending is artificially projected as flat through the turn of the century.

Environmental Expenditures by Level of Government

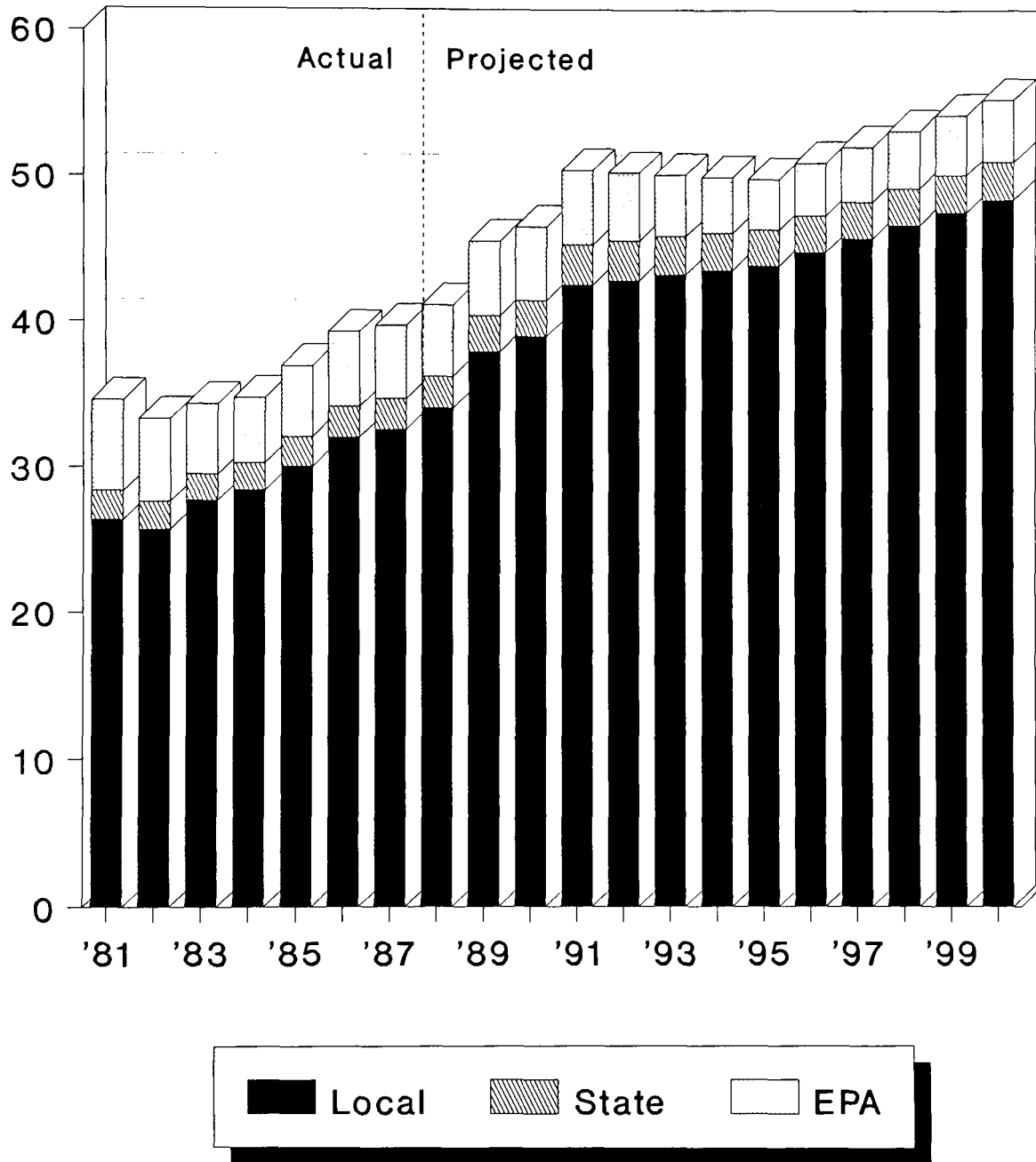
The future cost of maintaining current levels of environmental quality (the shaded area shown on Figure 1) falls unevenly on different levels of government, with municipalities expected to underwrite a growing share in the future. While EPA expenditures are expected to decline by a third between 1981 and 2000, local spending could almost double (see Figure 4).

EPA. EPA expenditures to maintain current programs are expected to decline from \$6.3 billion a year in 1981 to \$4.3 billion a year in 2000. This drop — from 18 per cent of national environmental expenditures in 1981 to less than 8 percent in 2000 — is attributable largely to the phasing-out of federal grants

Figure 4

Public Expenditures by Level of Government to Maintain Current (1987) Levels of Environmental Quality

In Billions of 1988 Dollars



Source: See Appendix 6

to build wastewater treatment plants. EPA's Construction Grants program will decline from the \$1.2 billion appropriated in 1989 and projected for 1990 to zero in 1991. Federal grants to help capitalize state wastewater treatment revolving loan funds will peak at \$2.4 billion in 1991 and decline to zero by 1995. There is no comparable federal assistance program in solid waste, and none anticipated within EPA or the Congress. EPA grants to states to administer the Safe Drinking Water Act have declined by 27 percent in real terms, from a high of about \$56 million in 1979 to an estimated \$41 million in 1989.

State Governments. The Bureau of the Census estimates that state outlays to administer environmental programs, comply with them where applicable, and provide assistance to localities for their compliance, have grown slowly from just under \$2 billion a year in 1981 to about \$2.1 billion in 1987. The Census data are roughly comparable to the results of a recent survey of state environmental expenditures that reported 1986 state outlays of \$1.9 billion for air pollution, drinking water, hazardous waste, indoor air pollution, marine and coastal initiatives, pesticides, solid waste, and water quality.¹² If current trends continue, state environmental expenditures could reach \$2.6 billion a year in 2000. This represents a decrease in the share of total public sector environmental expenditures accounted for by states, from 6 percent in 1981 to 5 percent in 2000. However, this study does not take into account the growing demands the states face in responding to new water quality and drinking water legislation. A recent EPA study found that state environmental departments as a whole will have a shortfall of \$309 million in 1995 alone to administer water programs.¹³

From 1982 to 1986, EPA grants to states funded 47 percent of state air quality control programs, 38 percent of water quality programs, and 54 percent of hazardous and solid waste control programs.¹⁴ The remainder of state program budgets are financed by fees, dedicated taxes, and general tax revenues. Of particular note, is the fact that grants to states have generally declined in real dollars as state program costs have increased, the net result being a precipitous drop in the proportion of state environmental budgets covered by EPA grants over the period (see Table 1).

Local Governments. Annual environmental expenditures by local governments are expected to nearly double by the year 2000, assuming there will be no effort to raise standards to improve environmental quality beyond current levels. If environmental standards are enforced, local capital expenditures will also have to double to compensate for scheduled reductions in federal grants. Operating expenses paid entirely by localities also are growing due to the use of more advanced chemical and energy-intensive treatment technologies. In 1981, localities spent about \$26 billion (76 percent) of the public share of environmental costs to comply with federal mandates (see Figure 5). By

Table 1
State Budgets and EPA Grants to States for Air, Water,
and Hazardous Waste Programs

	Total State Budgets (in millions of 1987 dollars)			EPA Grants as a Percentage of State Environmental Budgets		
	Air	Water ^a	Hazardous Waste ^b	Air	Water ^a	Hazardous Waste ^b
1982	\$210	\$23	\$64	49%	49%	76%
1983	\$213	\$274	\$76	45%	38%	66%
1984	\$206	\$296	\$110	46%	35%	47%
1985	\$202	\$326	\$146	48%	34%	41%
1986	\$213	\$336	\$169	46%	33%	40%

Source: Congressional Budget Office, *Environmental Federalism: Allocating Responsibilities for Environmental Protection*, Staff Working Paper (September 1988).

^a Includes water quality programs; some drinking water programs may be excluded.

^b Includes both hazardous and solid waste programs.

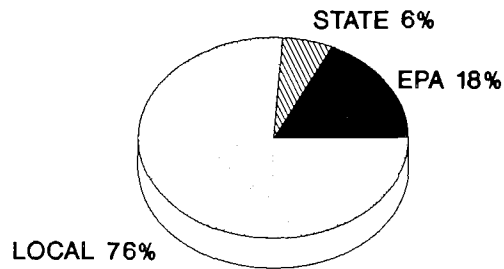
1987, these communities were spending \$33 billion and the local share had grown to more than 82 percent. By the year 2000, localities are projected to spend over \$48 billion and bear more than 87 percent of the public cost of environmental programs just to maintain current standards.

Additional Local Costs of New Regulations

The costs to local governments associated with new regulations are projected to reach \$5.3 billion by the year 2000 (see Figure 6).¹⁵ The report assumes that costs of municipal waste combustion air standards, \$2.5 billion, would be incurred in 1992, resulting in a large peak in that year. A more likely scenario is that these costs will be more evenly distributed over several years.

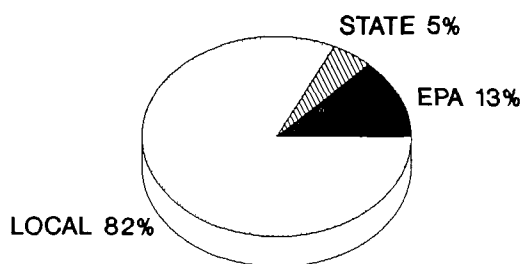
The \$5.3 billion is conservative, reflecting only a portion of the costs of federal environmental regulations that will take effect over the next five to ten years. It does not include any programs envisioned by Congress beyond 1987, and none of the growing number of new state or local environmental mandates.

FIGURE 5
Percentage of Public Expenditures by Level of Government to Maintain Current (1987) Level of Environmental Quality



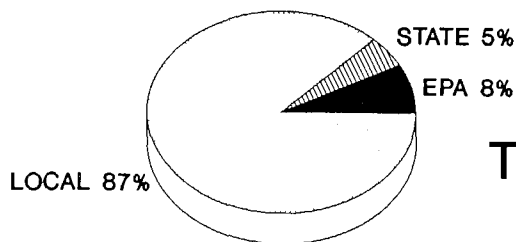
1981

**Total Spending =
\$35 Billion**



1987

**Total Spending =
\$40 Billion**



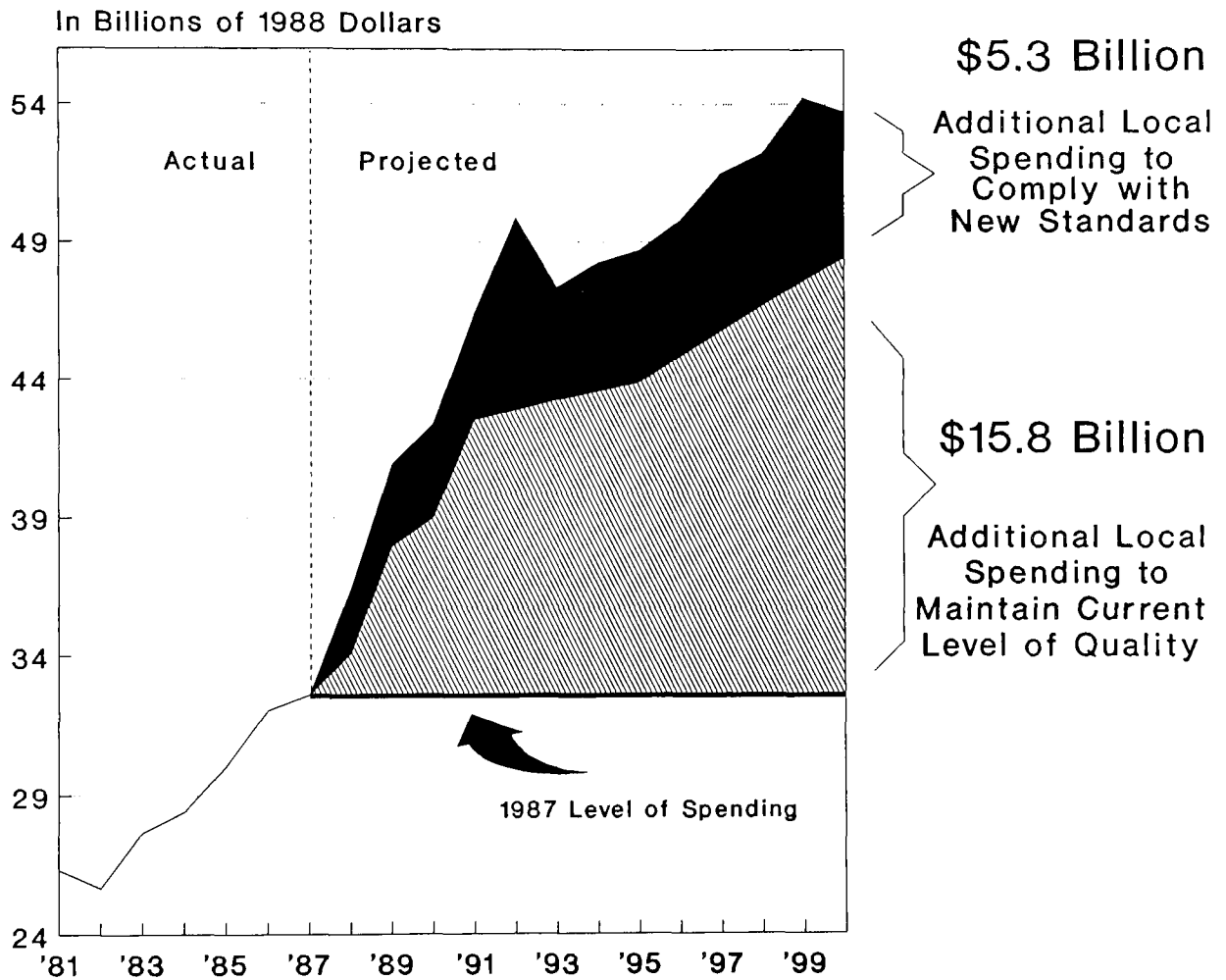
2000

**Total Estimated Spending =
\$55 Billion**

Source: See Appendix 6

FIGURE 6

Local Government Expenditures



Source: See Appendix 6

Water Quality

Local costs of new water quality regulations will average \$2.6 billion per year in the 1990s (see Figure 7). Most of these new costs are for building new or upgrading existing facilities to meet the secondary treatment requirements of the Clean Water Act. EPA estimated in 1988 that \$83.5 billion would be required to bring all municipal wastewater treatment facilities into compliance with minimum national standards.¹⁶

Drinking Water

Because the program initiated by the 1986 Amendments to the Safe Drinking Water Act (SDWA) has been slow getting started, the costs of these new regulations will be relatively low in the early 1990s, averaging \$36 million a year. By 1994, however, costs are projected to jump to \$539 million as the capital costs associated with these regulations start to be incurred. For the rest of the 1990's, annual costs will average \$830 million, dropping to \$500 million by 2000.

Solid Waste

New regulations included in the study significantly increase estimated solid waste expenditures. In 1992, for example, costs associated with new regulations are estimated at \$3 billion, almost half of the \$7 billion spent to maintain current environmental standards. This large increase is mostly due to capital costs associated with municipal waste combustion air standards. It is assumed that all of these municipal waste combustion capital costs, \$2.5 billion, will be incurred in 1992. For the rest of the 1990s, costs of new regulations are about \$1.2 billion each year.

Local solid waste management is a likely focus of Congress in the 1990s and the potential for costly new regulations is great. Concerns about hazardous residue from the incineration of municipal solid waste have already led Congress to consider regulating municipal ash as a hazardous waste. Potential costs for local governments would be very high. Also, the outcome of EPA's investigation of regulatory alternatives to control air emissions from municipal waste combustion will be an important determinant of future costs to local governments for disposal of solid waste.

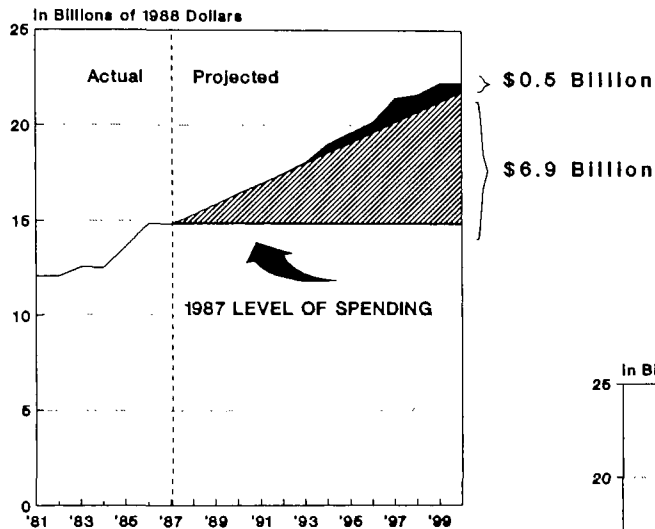
Total Local Expenditures by Media for the Year 2000

Adding the local costs of new regulations to the costs of maintaining current levels of environmental quality results in a small change in the proportion spent for each environmental program between 1987 and 2000 (see Table 2).

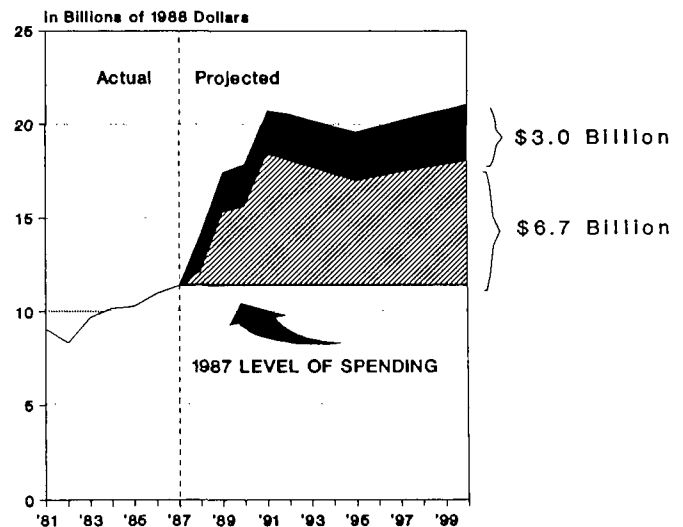
Figure 7

Local Government Expenditures by Media

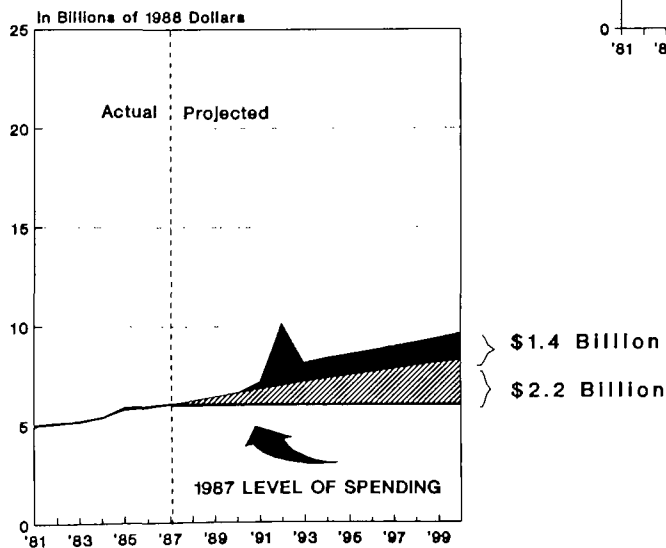
DRINKING WATER



WATER QUALITY



SOLID WASTE



Additional Local
Spending to Comply
with New
Environmental
Standards

Additional Local
Government Spending
to Maintain Current
Level of
Environmental
Quality

Source: See Appendix 6

The most important shift between 1987 and 2000 is the 4 percent increase in water quality expenditures from 35 to 39 percent of total expenditures and a corresponding 4 percent reduction in the percentage that is expended for drinking water, from 45 to 41 percent. This change is due primarily to the increased local costs of financing wastewater treatment facilities as federal grants are phased out. This reflects the fact that while local spending on water quality is increasing, the total public sector spending for water quality is estimated to decrease by 5 percent between 1987 and 2000 (from 41 percent to 36 percent). The percentage increase for other programs is largely due to costs imposed by new regulations examined in this study (Underground Storage Tanks Standards, Asbestos in Schools, and SARA Title III Requirements).

Table 2
Summary of Local Government Environmental Expenditures by Media
(In Billions of 1988 dollars)

Program	1987	Percentage of Total	2000 ^b	Percentage of Total	Percentage Increase 1987 - 2000
Water Quality	\$11.4	35.0 %	\$21.1	39.3%	85%
Drinking Water ^a	\$14.8	45.4%	\$22.2	41.4%	50%
Solid Waste ^a	\$6.1	18.7%	\$9.7	18.0%	59%
Others	\$0.3	0.9%	\$0.7	1.3%	133%
Total Local Spending	\$32.6	100.0%	\$53.7	100.0%	65%

Source: Apogee Research from U.S. Bureau of the Census and data prepared in 1988 by the Environmental Law Institute from EPA Regulatory Impact Analyses.

^a Includes costs to deliver services.

^b Cost of maintaining 1987 levels of environmental quality plus costs of new regulations.

2. Impact of Spending for Environmental Protection on Capital Markets

This chapter examines the impact on capital markets of the financing needs of local governments. The focus is on local governments because of the dramatic increase in local demands for capital for environmental services relative to other sectors and because of the availability of local cost estimates for implementing new regulations. The capital markets view is an important one when examining local costs because localities rely on municipal bonds to finance environmental facilities. Increasing local demands for capital signal proportional increases in demand for new bond issues.

Capital Requirements of Environmental Regulations

Capital formation by EPA, states, and local governments to maintain current levels of environmental quality is expected to fluctuate between \$13 billion and \$20 billion a year between 1987 and the year 2000 (see Figure 8). If recent trends continue, by the year 2000 most of the demand for capital to maintain current programs will be accounted for by local governments. Local demands for capital are estimated to increase from \$9.5 billion a year in 1987 to \$16.5 billion a year in 2000 (see Figure 9). State demands for capital are expected to remain stable over the same period and are relatively small, averaging about \$680 million per year.

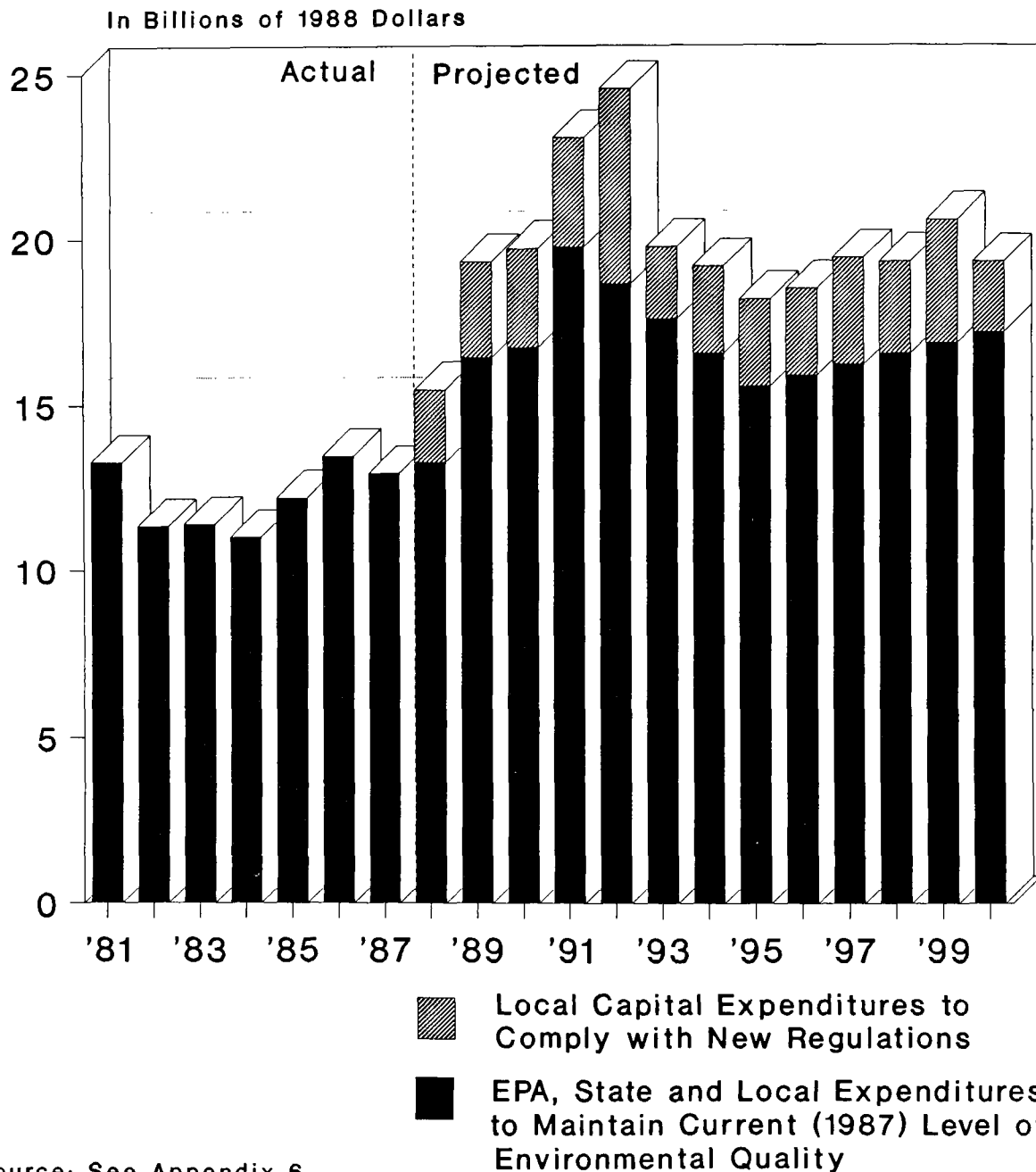
Estimated local capital costs of new regulations add an average of \$3 billion a year to local capital needs associated with current environmental regulations. As a result, localities are likely to have capital needs of nearly \$19 billion a year by 2000 (see Figure 9).

Moreover, as operating expenses grow, local governments could be forced to rely more heavily on borrowed funds to finance their capital needs. Annual operating and maintenance expenditures are expected to increase by 52 percent, from about \$23 billion in 1987 to \$35 billion in 2000 (see Figure 10). This rate of increase in operating expenditures, 3.6 percent a year, is almost three times the rate of population growth expected over this period. New environmental programs will add another 10 to 20 percent to these totals.

Figure 8

Capital Expenditures

EPA, STATES AND LOCAL GOVERNMENTS

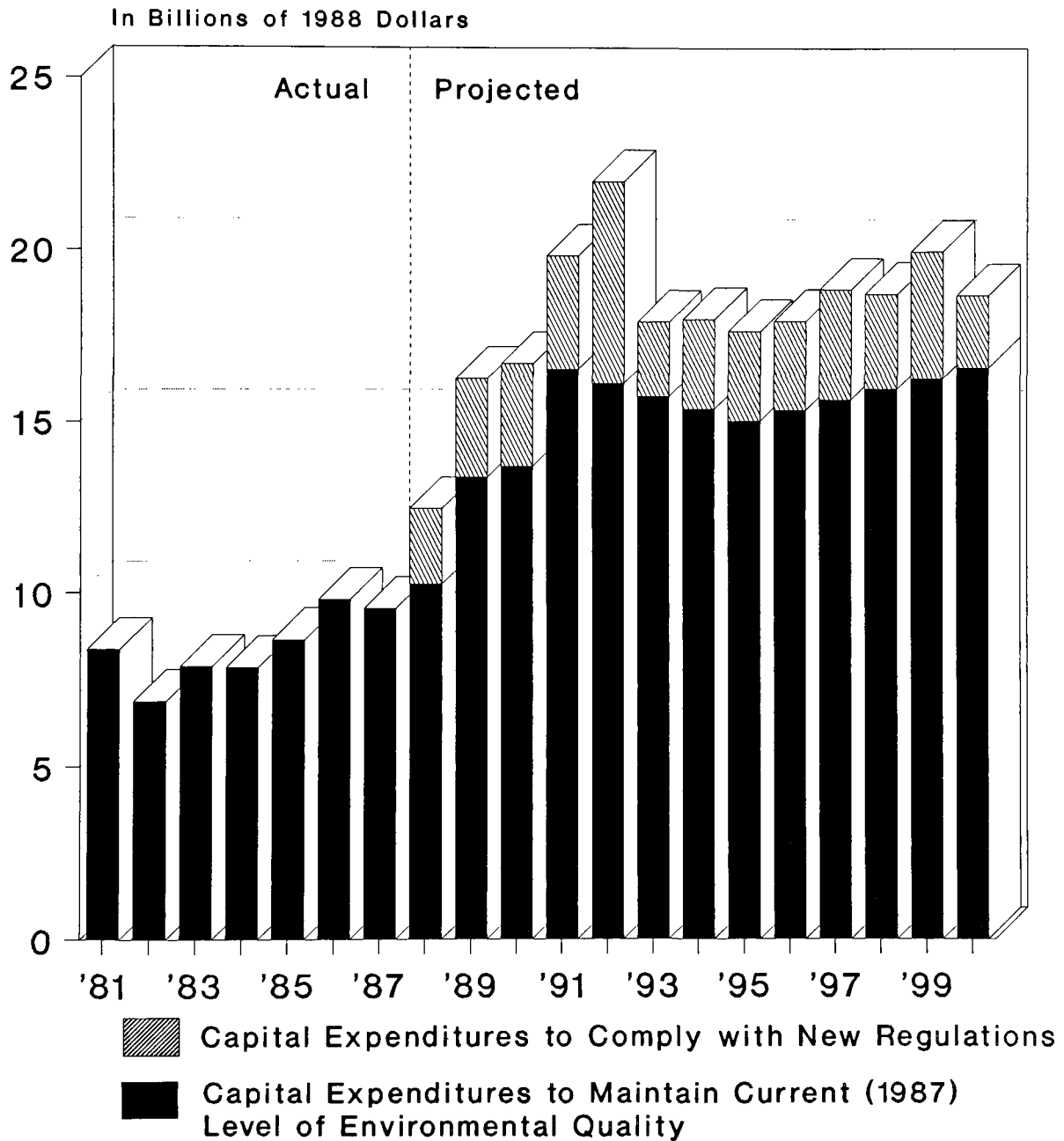


Source: See Appendix 6

Figure 9

Capital Expenditures

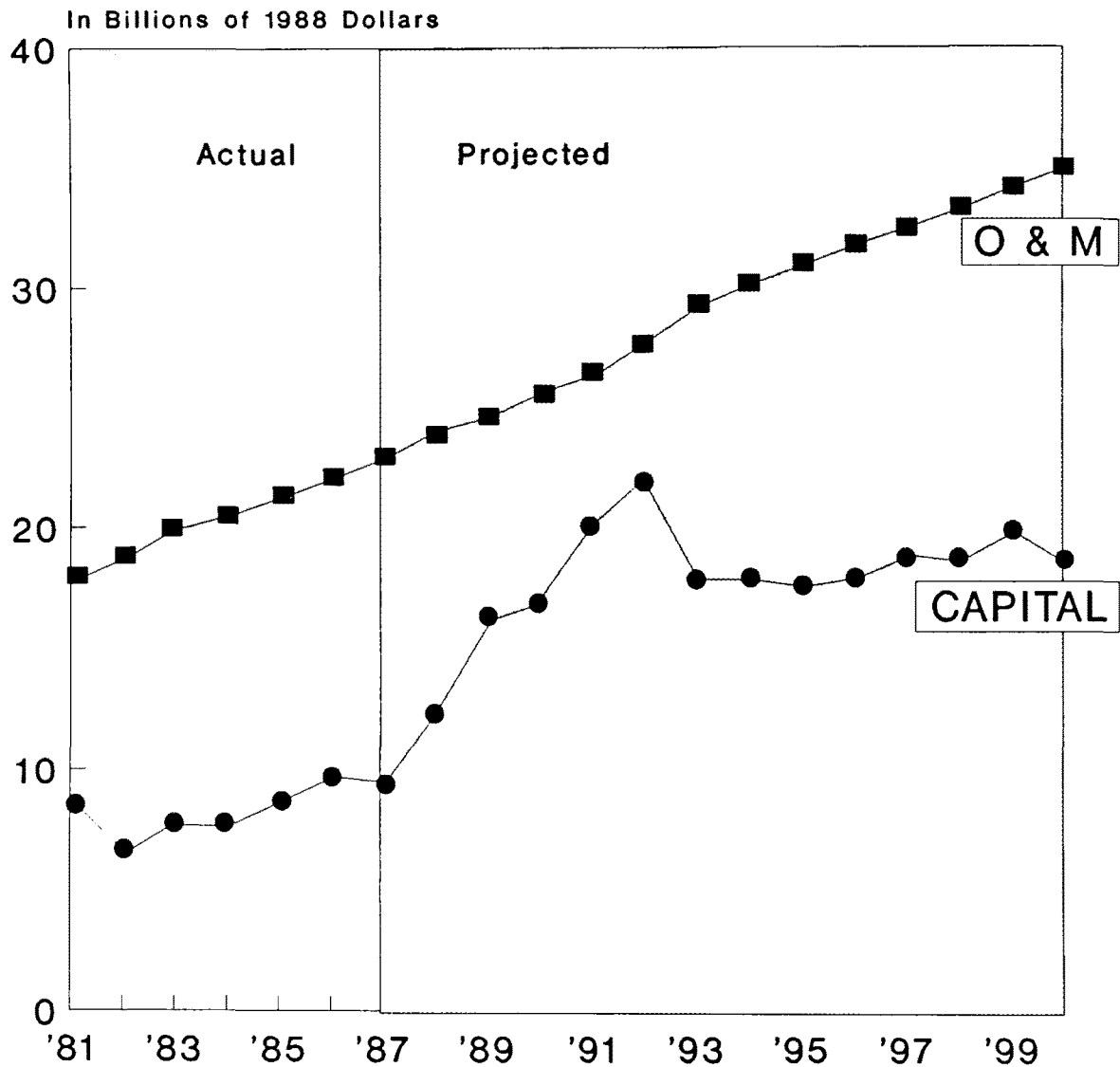
Local Governments Only



Source: See Appendix 6

Figure 10

Capital and O & M Expenditures* of Local Governments



* Includes Expenditures to Maintain Current (1987)

Environmental Quality and to Comply with New Regulations

Source: See Appendix 6

Substitution of Local for Federal Capital

Local demands for capital are projected to increase by 97 percent between 1987 and 2000. Concurrently, EPA's capital grants for local environmental services are scheduled to end by 1995 (see Figure 11). To a large extent, the substitution of local for federal capital results from the phasing-out of EPA construction grants for wastewater treatment facilities. Capital grants are expected to decline from \$4.5 billion in 1981 to zero when grants to capitalize state wastewater treatment revolving funds expire in 1994.

Financing Local Environmental Facilities

Because of a variation in intergovernmental roles, wastewater treatment facilities are currently financed differently than either water supply or solid waste management facilities. The federal role in financing wastewater treatment facilities is much more significant than in the other two areas.

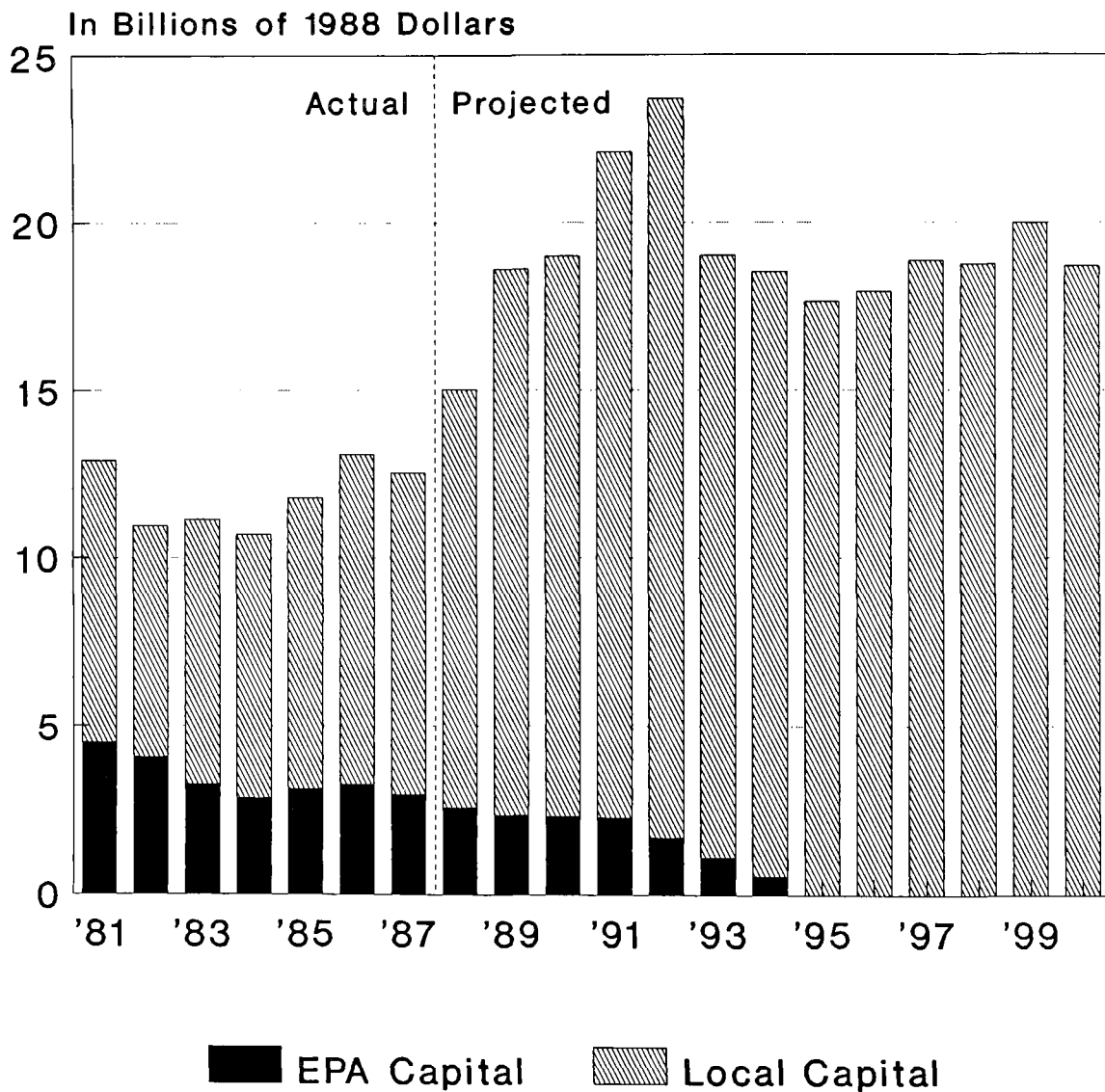
Wastewater Treatment

In the 1980s, municipal bonds have increasingly substituted for declining federal grants in financing wastewater treatment plants. Averaging \$3.9 billion a year, federal grants financed roughly half of all wastewater facilities from 1980 to 1984. Municipal bonds provided another \$2.3 billion a year in capital, on average. However, the ratio of grant-to-bond dollars fell significantly, from 2.93 in 1980 to 0.56 in 1988 (see Table 3). State assistance, private loans, retained earnings, and private equity made up the remaining sources of wastewater capital.

Federal support for wastewater treatment will approach zero by 1994. EPA's Construction Grants program, the largest source of federal aid to build wastewater treatment plants, ends after 1991.¹⁷ Beginning in 1989, federal grants will help capitalize state revolving loan funds (SRFs) in place of construction grants, but they expire in 1994. The federal role in financing wastewater treatment plants will be reduced to small, targeted programs. In many states, even if SRF payments are reinvested or leveraged, SRF programs are not expected to meet financing needs.¹⁸ Even with the SRF program in place, some 20 states will face a combined financing need of nearly \$57 billion.¹⁹

Figure 11

Comparison of EPA* and Local Government Capital Expenditures



Source: See Appendix 6

* Construction Grants

Table 3
Estimated Sources of Capital Used to Finance Municipal
Wastewater Treatment Works (current dollars)

Year	Federal Grants*	Municipal Bonds	Ratio of Grants/Bonds
1980	\$4,720	\$1,610	2.93
1981	\$4,293	\$1,620	2.65
1982	\$4,113	\$2,870	1.43
1983	\$3,416	\$2,410	1.42
1984	\$2,969	\$3,150	0.94
1985	\$2,900	\$7,007	0.41
1986	\$3,113	\$6,823	0.46
1987	\$2,920	\$4,517	0.65
1988	\$2,514	\$4,498	0.56
Average	\$3,440	\$3,834	0.90

Source: Published and unpublished data supplied by the Bureau of the Census and The Public Securities Association.

* Includes EPA Construction Grants, Farmers Home Administration Sewer Grants; Department of Housing and Urban Development Community Development Block Grants (sewer uses); and Economic Development Administration Grants (sewer uses).

Moreover, municipalities in many of these and other states face escalating operating expenses, tending to put upward pressure on user fees which, on the margin, will make capital financing more difficult. In 1960, for example, the average local operating cost per person served by a central sewer system was \$17.67 a year. At the beginning of EPA's Construction Grants program in 1972, these costs were \$19.35 a year. By 1984, they had grown to \$41.61 per person. Per capita operating costs should continue to grow as more sophisticated energy and chemical-intensive treatment processes come on-line, particularly in small communities with limited economies of scale. Higher operating expenses can reduce the ability of localities to issue debt for capital investments, especially in areas where the average annual income is low.

Water Supply

While water supply capital needs (\$4 to \$5 billion a year in the 1980s) are equivalent to those of the nation's wastewater treatment plants, water supply systems have received almost no federal assistance. Traditionally, municipal systems have financed capital needs via a mix of tax exempt municipal bonds (about 60 percent); retained earnings (20 to 30 percent); state and federal grants (5 to 10 percent); and other sources such as private loans, special tax assessments, and private equity (5 to 10 percent). Larger water systems tend to rely more heavily on bonds than do smaller ones, which generally rely on private bank loans to finance capital needs.

Solid Waste Management

There is no federal aid for local solid waste management. Local governments spend about \$700 million a year for capital improvements. The literature is far less revealing on the financing of solid waste facilities than on financing for wastewater management and water supply. The few reports that address the issue agree that municipal bonds provide the majority of investment capital for publicly-owned waste management facilities.²⁰ Like water and wastewater plants, however, some publicly-owned facilities finance capital improvements with retained earnings, private bank loans, or private equity.

Impact on Capital Formation

The impact of capital demands for environmental services on local capital formation can be examined from two perspectives: the ability of the market to respond to the capital demands, and the ability of local governments to raise capital. Assuming that the market will respond if the price of capital can be met, the key issue is municipal ability to support capital formation.

Whereas private companies often pass along the costs of capital to consumers by adjusting the price of goods and services, local governments are more limited in their ability to meet capital needs. Frequently, elected officials face political difficulties in raising taxes or fees, or legal constraints on their authority to raise revenues imposed by statutes, regulations, or state constitutions. In other cases, local resources may be inadequate to support large amounts of debt. This is often true for small municipalities having relatively high fixed costs of issuing bonds, limited revenue bases and no economies of scale. If capital-intensive facilities are forced on these and other cities, the cost of increased capital formation could crowd out other investments.

Can the Capital Markets Respond?

By the year 2000, municipalities will need to issue approximately \$18.7 billion in bonds for wastewater, drinking water and solid waste projects. Compared to the volume of bonds issued to finance these projects in the 1980's - from \$4.5 to \$9 billion a year - this change in volume, roughly twice the current rate, would not be unusual.

In water supply, for example, meeting the capital needs of the 1986 Safe Drinking Water Act will require an estimated \$0.5 billion to \$1.0 billion a year in new capital financing over the period 1994 to 2000. This would represent a 25 to 35 percent increase over the current volume of water supply bonds - fluctuations well within the range in volume for such bonds between 1977 and 1985.

In addition, debt issued for environmental purposes is a small percentage of the total debt issued by state and local governments (see Table 4). Debt issued for water and sewer projects was only 14 percent of state and local debt in 1960 and 1970 and declined to 9 percent by 1987.

Limitations on Municipal Capital Financing

The overall volume of bonds necessary to meet new capital requirements is not unmanageable from the perspective of market expansion. However, large capital demands associated with environmental services often cause large peaks in capital needs that can crowd out other investments. For example, San Diego has a total outstanding debt of about \$1.3 billion but is faced with a cost of \$800 million for an ocean outfall (conveyance of treated wastewater to the ocean). If financed by long-term debt, the cost of the conveyance would represent a 61 percent increase in the city's total outstanding debt. The large capital demands for this project would limit the amount of debt the city could issue for other purposes.

Moreover, the ability of some cities, especially small ones, to issue new debt is limited and most of the nation's environmental systems are in small communities. Approximately 90 percent of all community water systems serve fewer than 3,300 residents; 88 percent of all wastewater treatment systems handle less than 1 million gallons per day; and most of the solid waste landfills in the nation serve communities under 10,000.²¹

Table 4
Water/Sewer Debt as Percentage of Total State and Local Debt
(billions of 1988 dollars)

Year	Water/Sewer Debt	Total State & Local Debt	Water/Sewer as Percent of Total
1960	\$4.57	\$31.67	14%
1970	\$8.14	\$59.02	14%
1980	\$4.49	\$60.91	7%
1987	\$9.17	\$105.83	9%

Source: Apogee Research from data compiled by the Public Securities Association.

Because they are not well known, small communities do not have established credit ratings, forcing them to seek generally higher-cost commercial loans to finance capital expansion. When they are able to issue bonds publicly, small denominations often bear a high cost of capital for two reasons: because the fixed costs (e.g., legal fees and underwriters fees) are more burdensome when spread over a small base, and because the credit markets generally demand a premium to compensate the risks of lending money to small communities with a less certain ability to repay principal and interest.

The EPA recently completed a study that examines the ability of different sized cities to raise capital for environmental programs through the bond market.²² If the increases in debt service attributable to either the capital demands of all new drinking water regulations or new water quality regulations were limited to 1 percent of gross household income (about a doubling in current user fees), EPA estimates that 26 percent of all cities under 2,500 persons (nearly 7,000 cities and towns) could have trouble issuing revenue bonds. Fewer than 10 percent of cities with populations between 2,500 and 250,000 would have similar problems. Eleven percent of cities with populations of more than 250,000 would have trouble issuing new revenue-backed debt.

Even if municipalities were willing to offset user fees with general revenues and their full taxing powers were brought to bear on the issuance of general obligation bonds to support new environmental initiatives, most small cities would be no better off. In contrast, medium and larger cities would benefit significantly. While about 21 percent of all small cities would still face difficulties issuing new bonds, the proportion of medium and large cities expected to have trouble in the capital markets would decline to 3 percent and 0 percent, respectively.

But these calculations account for only the capital demands imposed by *new regulations*. The ability of many cities (regardless of size) to support new bonds to cover *total capital needs* by the year 2000 — capital replacement plus the demands of new programs — worsens the outlook presented above.

3 • Impact of Environmental Spending on Households

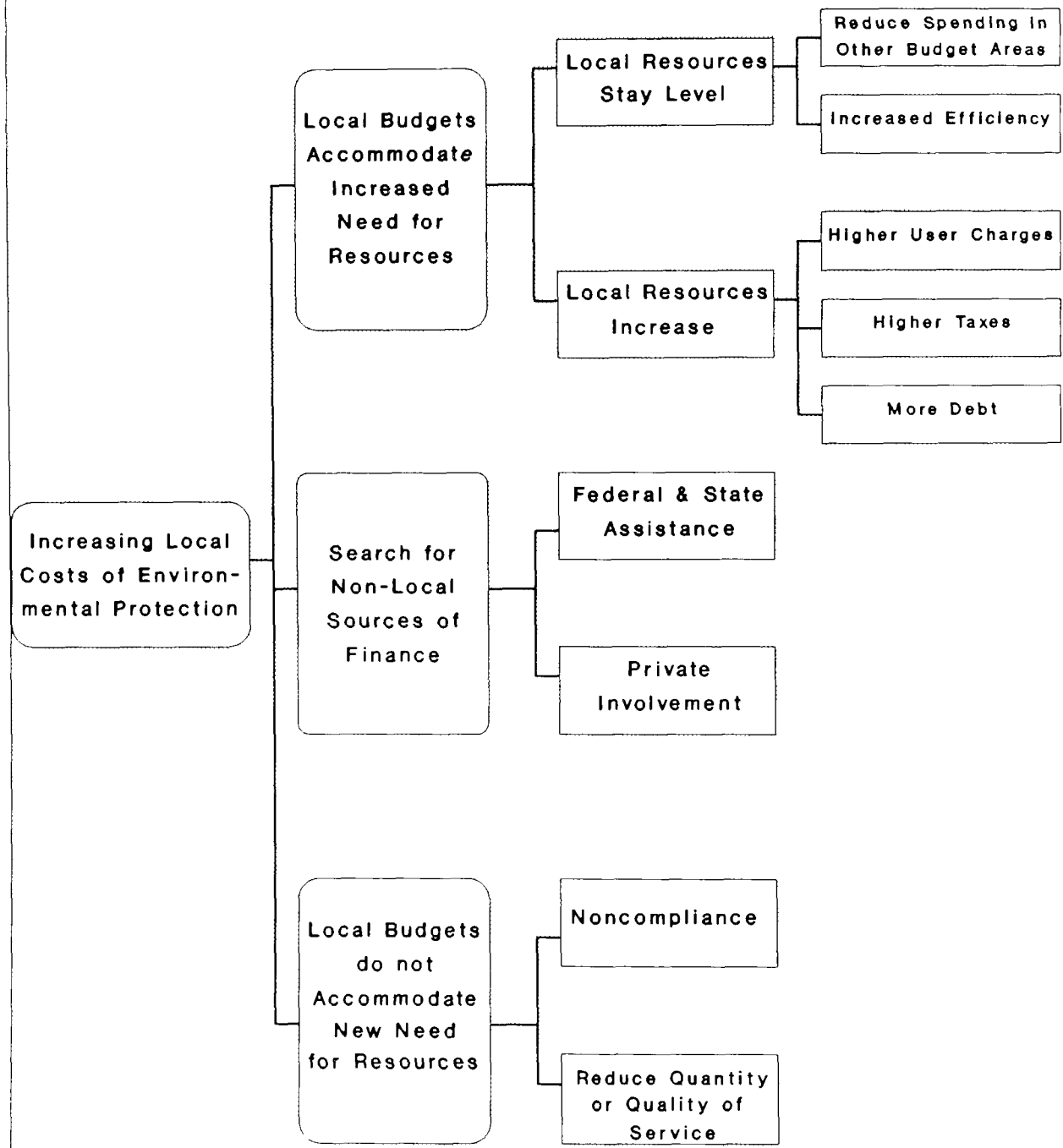
As municipalities are the primary providers of environmental services, local government responses to increasing costs of these services will determine, to a large extent, the impact on households. There are three ways local governments may respond (see Figure 12). Local budgets could accommodate increased demand for resources by increasing own-source revenues through (1) higher user charges or taxes (2) increasing the efficiency of current programs, or (3) shifts to environmental services from spending in other budget areas. Second, local governments could seek alternative sources of finance, either through federal and state assistance or by involving private companies in the finance and provision of environmental services. Finally, local governments could choose not to accommodate the higher costs of environmental services, which might lead to noncompliance or reduced quality or quantity of service.

Meeting the increasing costs of environmental services with local revenues means that households and businesses must pay for regulations financed at the municipal level through increased user charges, increased general taxes, or reduced levels of services in competing municipal programs. The household effects of environmental spending are calculated assuming all capital facilities are financed with long-term bonds backed by user fees. Under these assumptions, lump-sum capital outlays are amortized, with the annualized payments to capital added to operating and maintenance outlays each year. The result is divided by the number of households served to provide an estimate of the household resources necessary to pay for environmental services. After recalculating to take out costs paid by industrial and commercial facilities, the estimates reflect increases in direct costs for average households.²³

To the degree that costs to private companies are passed on to consumers in the form of increased prices for goods and services, household costs will increase. However, environmental compliance costs typically constitute only a small portion of the total cost of production. Therefore, resulting price increases will not have a significant effect on consumption of a product or service.

Figure 12

Local Government Responses to Increasing Costs of Environmental Protection



Household Costs of Environmental Programs

If current trends continue, the average household will spend \$647 a year by the year 2000 for environmental services including drinking water, wastewater treatment, and solid waste management (see Table 5). This is 54 percent more than the average household payment for such services in 1987. The largest increment, \$599 dollars a year in 2000, is attributable to simply maintaining the current level of environmental and service standards. The average annual cost of complying with new regulations is estimated to be an additional \$48.²⁴

Household Payments by City Size to Maintain Current Levels of Environmental Quality

Implementing current environmental programs will have more profound effects for households in smaller cities than in larger ones. Small cities face limited economies of scale in the provision of environmental services and generally higher costs of capital. These two effects combined tend to drive up the price of environmental protection for small cities.

As a result, households in the smallest cities are expected to pay substantially more than those in large and medium-sized cities through the turn of the century. Household costs are expected to increase by about 88 percent, from \$670 in 1987 to \$1,263 in 2000 in the smallest cities (less than 500 population). Household payments to maintain current programs in medium-sized cities (populations from 50,000 to 100,000) will increase by 38 percent, on average from \$373 in 1987 to \$515 in 2000. Household costs in large cities (populations in excess of 500,000) will increase by 36 percent, from \$393 in 1987 to \$533 in 2000.

Household Payments for New Regulations

The cost of new regulations must be added to the large increases in household costs of current programs. Households in cities with populations below 500 will pay an additional \$317 a year to comply with new regulations in 2000. For the largest cities, new regulations will cost the average household \$93 more each year by 2000. Households in medium-sized cities, with populations of 10,000 to 50,000 and 50,000 to 100,000, are faced with additional costs of \$24 each year.

Table 5
Average Annual Household Payments for Environmental Services
for a Sample of 8,032 Cities, Towns, and Townships (1988 Dollars)

City Size	Average Payments in 1987	Additional payments to maintain current levels of environmental quality in 2000	Additional payments to comply with new environmental and service standards in 2000	Total Estimated household payments for environmental protection in 2000
500 or less	\$670	\$593	\$317	\$1,580
500 - 2,500	\$473	\$223	\$67	\$763
2,500 - 10,000	\$433	\$143	\$29	\$605
10,000 - 50,000	\$444	\$197	\$24	\$665
50,000 - 100,000	\$373	\$142	\$24	\$539
100,000 - 250,000	\$291	\$111	\$34	\$436
250,000 - 500,000	\$335	\$126	\$68	\$529
500,000 or more	\$393	\$140	\$93	\$626
Population Weighted Average	\$419	\$180	\$48	\$647

Source: Apogee Research, from U.S. Bureau of Census, 1986 Survey of Community Water Systems, and data compiled by the Environmental Law Institute from EPA Regulatory Impact Analyses.

Household Payments for Environmental Programs Compared to Income

The difference in costs between households based on city size is even more dramatic when examined as a percentage of household income (see Table 6). For the smallest cities, with lower household income and higher costs per household, the cost of environmental protection as a percentage of household income will increase from 2.8 percent in 1987 to 5.6 percent in 2000. For medium-sized cities the percentage is expected to change slightly during the period 1987 to 2000, from 1.0 to 1.2 percent, and in large cities, to change from 1.1 to 1.5 percent.

Estimates of costs as a percentage of household income may be conservative because, to the extent that companies pass through environmental costs to consumers, household income will be reduced. As a result, the costs of environmental protection as a percentage of household income could be higher.

Household Payments by Program

Household costs of each environmental program, including those to maintain levels of environmental quality and to comply with new regulations in the year 2000, differ by city size category (see Table 7). Households in smaller cities will pay comparatively more than households in either large or medium-sized cities. Pending wastewater improvements along with the additional future costs of maintaining current levels of environmental quality will cost the average household in cities of 500 or less about \$259 a year by 2000, when all regulatory programs are assumed to be on-line. Drinking water regulations will add another \$366 a year and solid waste regulations another \$218. This adds up to \$910 for households in small cities, in addition to the baseline amount of \$670.

Households in medium-sized cities (50,000 to 100,000) are expected to pay less than a third of the amount paid by households in small cities for wastewater treatment, 17 percent of that paid for drinking water, and only 9 percent of the amount spent for solid waste. This is in addition to the baseline amount of \$373 that is about half that of small cities (\$670). The largest cities (500,000 and above) are also expected to pay sums comparably much less than the smallest ones. Wastewater treatment and solid waste show decreasing economies of scale with the result that households in large cities will pay more for these services than those in medium-sized cities. However, household costs are much less than in the smallest cities. Households in large cities will pay 56 percent of the amount paid for wastewater treatment in small cities and 18 percent of that paid for solid waste. As drinking water shows increasing economies of scale, households in large cities will only pay 11 percent of household costs in small cities. This is in addition to a baseline of \$393, that is only 59 percent of the 1987 cost for households in small cities.

Water Quality

Wastewater treatment is the highest cost service for households in most city sizes. Costs are estimated to be particularly high for households in the smallest cities, where substantial investments are necessary to bring wastewater treatment facilities into compliance with minimum national standards.

Table 6
Cost of Environmental Protection Per Household as Percentage of Household
Income, By City Size (1988 Dollars)

City Size	1987			2000		
	Average Household Cost of Environmental Programs	Average Household Income	Cost as a Percentage of Household Income	Average Household Cost of Environmental Programs ^a	Average Household Income	Cost as a Percentage of Household Income
500 or less	\$670	\$24,277	2.8%	\$1,580	\$28,357	5.6%
500 - 2,500	\$473	\$26,361	1.8%	\$763	\$30,792	2.5%
2,500 - 10,000	\$433	\$30,546	1.4%	\$605	\$35,680	1.7%
10,000 - 50,000	\$444	\$31,685	1.4%	\$665	\$37,010	1.8%
50,000 - 100,000	\$373	\$37,189	1.0%	\$539	\$43,440	1.2%
100,000 - 250,000	\$291	\$33,769	0.9%	\$436	\$39,445	1.1%
250,000 - 500,000	\$335	\$31,943	1.0%	\$529	\$37,312	1.4%
500,000 or more	\$393	\$34,756	1.1%	\$626	\$40,597	1.5%
Population Weighted Average	\$419	\$31,617	1.3%	\$647	\$36,931	1.8%

Source: Apogee Research, from U.S. Bureau of Census, 1986 Survey of Community Water Systems, and data compiled in 1988 by the Environmental Law Institute from EPA Regulatory Impact Analyses.

^a Includes costs of maintaining current levels of environmental quality plus costs of complying with new regulations.

Drinking Water

The largest cost to households in small cities in the year 2000 is estimated to be for drinking water programs. About 95 percent of the total estimated costs of drinking water programs in 2000 is associated with current Safe Drinking Water Act programs and the provision of adequate quantities of water.

Table 7
Increase in Annual Household User Charges in 2000 to Maintain Existing Levels of Environmental Quality and To Comply with New Regulations (in 1988 Dollars)

Municipality Size Category	Average Payment in 1987 ^a	Additional Fees By Program in the Year 2000				
		Wastewater Treatment	Drinking Water	Solid Waste	Other	Total Additional Fees
500 or less	\$670	\$259	\$366	\$218	\$67	\$910
500 - 2,500	\$473	\$174	\$59	\$43	\$14	\$290
2,500 - 10,000	\$433	\$85	\$59	\$19	\$9	\$172
10,000 - 50,000	\$444	\$124	\$71	\$19	\$7	\$221
50,000 - 100,000	\$373	\$77	\$64	\$20	\$5	\$166
100,000 - 250,000	\$291	\$63	\$63	\$14	\$5	\$145
250,000 - 500,000	\$335	\$114	\$43	\$33	\$4	\$194
500,000 or more	\$393	\$146	\$42	\$40	\$5	\$233

Source: Apogee Research, from U.S. Bureau of Census, 1986 Survey of Community Water Systems, and data compiled in 1988 by the Environmental Law Institute from EPA Regulatory Impact Analyses.

^a See Appendix 5 for average 1987 payments by media.

Solid Waste

Household expenditures for solid waste show a trend similar to that for the other environmental services, with households in the smallest cities expected to pay more than 5 times the amount paid by households in larger cities. For the larger size categories, estimated household costs of solid waste programs show reverse economies of scale. This is due to the amount of quality and quantity-related costs included in total solid waste expenditures. There are limited economies of scale in providing greater quantities of solid waste

services. Costs of maintaining existing levels of environmental quality, that are mostly quantity-related, constitute the majority of total costs in cities larger than 2,500. Thus, for the most part, larger cities do not benefit from economies of scale normally associated with environmental service provision in medium-size cities.

4. Conclusions

The purpose of this study was to document the public costs of environmental protection for EPA, the states, and local governments and to use the data to examine the changes, distribution, and the impact of these environmental costs. Within the context of existing research parameters and specified methodology, the study successfully documents these costs for the period 1981-1987 and projects them to the year 2000.

Findings

The study found that the public costs of maintaining current (1987) environmental quality will grow from \$40 billion a year in 1987 to more than \$55 billion in 2000. Another \$5.3 billion a year will be required by local governments alone in 2000 to comply with the 22 new environmental regulations also examined in the study.

Detailed analysis of the data also reveals significant potential cost impacts on local governments and households. These impacts include:

- The local share of public environmental spending is projected to rise from 76 percent to 87 percent during 1981-2000.
- Local demand for capital is projected to double during that same period.
- Average household costs for environmental services are projected to increase by 54 percent, with much larger increases occurring in small communities.

These findings represent an important step in examining the current and future cost implications of the expanded programs and tightened environmental standards that the American people are demanding. They suggest the need for a continuing re-examination of how the nation finances environmental protection.

Study Qualifications

EPA recognizes the importance of continuing to obtain and refine information on the costs of implementing environmental regulations in all program areas. Accordingly, the Agency is following up on this study with the report *Cost of A Clean Environment* that will document private sector/industry costs

as well as all governmental costs for existing and new regulations. This report is required pursuant to the Clean Air and Water Acts and will serve to further our understanding of the environmental resource needs facing EPA and the nation.

Because this cost study was meant to be an initial effort, it is important that the findings be viewed as preliminary in nature and considered within the context of a number of qualifications (also see Appendix 1). These include:

- The study limits the scope of its analysis by basing projections of future environmental costs on the 1987 level of environmental quality. Actual compliance levels will most likely differ from this level and vary by program.
- No provision is made for changes in existing programs or for new regulations other than the 22 listed. Such changes will occur, but cannot be adequately predicted. And, costs for them cannot be uniformly or accurately determined.
- Documented and projected costs to maintain current standards in the areas of drinking water and solid waste include costs for the delivery of the services.

Notwithstanding any limitations, the study provides a valid initial reading of the fact that governments, particularly local ones, will face significant environmental management and financing challenges in the years ahead. This requires immediate attention and action if we are to successfully meet environmental mandates.

Next Steps

Recognizing that the costs of environmental protection are growing and that they call for innovative approaches to financing environmental programs and activities, EPA has developed a number of Agency-wide initiatives to help address the environmental and resource challenges, promote greater cooperation with state and local governments, and encourage the use of innovative technologies. These include:

- **Pollution Prevention** - This initiative promotes an integrated environmental approach stressing the prevention of pollution through techniques such as waste minimization and recycling.

- **Public-Private Partnerships** - These partnerships exist when the public and private sectors share responsibility for providing environmental services. EPA is focusing on promoting and establishing partnerships in drinking water, wastewater treatment and solid waste at the local level.
- **Alternative Financing** - This initiative assists various government entities in discovering and using funding mechanisms other than general appropriations or federal grants to raise revenues. The Agency's new Environmental Financial Advisory Board is an integral part of this effort.
- **Technology Development** - As part of EPA's support role in providing states and localities with the tools needed to implement required programs, this initiative strives to reduce compliance costs via the development of cleanup technologies that are more effective and efficient.
- **Technology Transfer** - Technology transfer seeks improved environmental results by creating a climate that fosters cooperative approaches to solving problems, building knowledge and skills, and expanding the use of technology transfer through technical assistance training and focused information dissemination.

With all levels of government and the private sector working together on these and other environmental initiatives, the nation can begin to address the significant emerging challenges identified in this report.

Appendix 1

Methodology

This study documents recent EPA, state and local government expenditures for environmental protection and projects future costs to the year 2000. Costs to local governments associated with new regulations are added to the EPA, state and local costs of maintaining current levels of environmental quality for all current programs in order to examine the growing gap between current expenditures and future costs of environmental protection. In turn, trends in the distribution of costs among EPA, the states, and local governments are assessed. Finally, the impacts of environmental policies on local governments, capital markets, and households are analyzed.

Trends in the expenditures of local governments and impacts at the local level are examined in more detail than for other levels of government because more local data are available at this time.²⁵

Definition of Expenditures

The terms expenditures, spending, and outlays are used interchangeably in this report. They follow the definition of expenditures used by the Bureau of the Census. Capital expenditures include acquisitions of depreciable plants and equipment, replacement, and expansion as well as expenditures for construction in progress. Research and development spending is excluded.

Operating and maintenance expenditures account for the purchase of materials, parts, supplies, fuel, and power; upkeep or leasing of equipment; direct labor; and purchased contract services. Depreciation of plants and equipment are excluded, as are the costs of financing capital equipment.

This report examines two kinds of expenditures: (1) federal, state, and local spending to maintain the current levels of environmental quality and (2) local spending to comply with new regulations.

Which Environmental Services, Regulations, and Sectors are Included?

The following is an explanation of the environmental expenditures included and sectors for which data are available. Expenditures to maintain current levels of environmental quality are more comprehensive because cost estimates for new regulations are available only for local governments.

Calculating Expenditures to Maintain Current Levels of Environmental Quality

A. Environmental Services

- Wastewater Treatment - expenditures pursuant to the Clean Water Act, including those for construction, management, and operation of facilities to monitor and control municipal and industrial wastewater
- Drinking Water - expenditures pursuant to the Safe Drinking Water Act plus those to supply adequate quantities of potable water
- Solid Waste - expenditures pursuant to Subtitle D of the Resource Conservation and Recovery Act (RCRA) plus those for solid waste collection, transportation, and disposal services
- Hazardous Waste - other expenditures pursuant to RCRA
- Superfund - expenditures pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
- Air Quality - expenditures pursuant to the Clean Air Act
- Toxic Substances - expenditures pursuant to the Toxic Substances Control Act (TSCA)
- Pesticides - expenditures pursuant to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Energy - expenditures pursuant to the Energy Security Act

In addition, the study covers several EPA program areas administered independently of these programs, including management and support, radiation, interdisciplinary, and the Leaking Underground Storage Tanks Trust Fund.

B. Sectors

Expenditures to maintain current levels of environmental quality include those by EPA, the states, and local governments, as currently available in public budgets and national aggregate statistics. Although a major effort was made to include most of the relevant costs, some gaps in the data were

unavoidable. Expenditures that are included in this study and those that we were not able to gather at this time are summarized below by sector.

Federal. At the federal level, this study includes only programs managed by the EPA, although other federal agencies administer similar programs. EPA expenditures by program area were derived from the Agency's annual budget justification documents.²⁶

State Governments. The Bureau of the Census collects the only consistent data on state expenditures to administer air, drinking water, and wastewater treatment programs. They are reproduced in this study as produced and labeled by the Census Bureau. Expenditures for leaking underground storage tanks and hazardous waste programs were estimated from the requirements to match federal grants. For each of these program areas, it is impossible to distinguish among the various types of state expenditures, such as program administration, assistance to local governments, compliance, and intergovernmental coordination. At this time, we are unable to gather consistent time-series data on state expenditures for solid waste, Superfund, or hazardous waste programs.

Local Governments. Local expenditures are also reproduced from Census reports, although the figures for intergovernmental grants to localities have been removed in this study, leaving only local spending from their own sources. Expenditures are included for drinking water, wastewater treatment, and solid waste management services. While local expenditures for other programs are not reported to the Bureau of the Census in separate categories, they may be reported under one of the above categories.

Local capital and operating expenditures for drinking water and solid waste management cover both the delivery of adequate quantities of services (water flows to meet all demands; adequate garbage removal and disposal) and the assurance of mandated quality of services (maximum concentration of pollutants in potable water; testing and containment in landfills). To be fair in a comparison of the effects of future regulations, one might argue that the appropriate baseline is quality expenditures, exclusive of those to deliver adequate quantities. While arguably appropriate, the data were not sufficiently detailed to separate expenditures for quantity from those for quality of service. Therefore, in projecting the cost of maintaining current programs, both of these components were included.

Calculating Local Environmental Costs Associated with New Regulations

In this report, costs of new regulations include only those for local governments. The new regulations considered in the study are associated with local wastewater treatment, drinking water, and solid waste programs. In addition, estimates of costs are provided for several other regulations that are independent of these program areas. In total, costs were estimated for 22 new regulations (see Table 8).

The estimated local costs of new regulations were derived from Regulatory Impact Analyses (RIAs) prepared for EPA program offices in 1988. These estimates are conservative for a number of reasons. First, of the 37 pending regulations impacting local governments, only 22 had sufficiently precise cost estimates for inclusion in this study.²⁷ Second, when RIAs estimate capital costs, they generally include only the installed cost of plants and equipment. When these investments are financed with municipal or industrial bonds or loans, transaction costs can add 20 percent or more to capital cost estimates. Moreover, this study cannot account for several regulations that are currently under development pursuant to federal environmental statutes reauthorized in the mid-1980s.²⁸ Also, major programs will be reauthorized in the next few years including RCRA and the Clean Air Act. New costs associated with these programs could be significant. Finally, this study does not incorporate the cost of new state environmental regulations that would impose costs in addition to those attributable to federal regulations.

How Future Costs were Derived

Current Regulations

The future costs of maintaining current levels of environmental quality were estimated for each program area and level of government by regressing five years of historical spending trends against time. The projections assume that factors contributing to recent spending trends will continue to do so in the future. Such factors include population growth, implementation of current policies, rates of compliance, replacement of current capital facilities, and budget cutbacks. Significant changes in any of these factors could have an important effect on costs. For example, rates of compliance are related to enforcement efforts. If enforcement activities increase, then costs would be

expected to increase as a result of higher rates of compliance. The projections for both current and new regulations factor in an inflation rate and are expressed in 1988 dollars.

New Regulations

Full compliance is assumed in estimating costs of new regulations. The costs and timing of new regulations with an impact on local governments were estimated based on information included in 1988 Regulatory Impact Analyses (RIAs) prepared for EPA's program offices. Demand for capital attributable to these regulations is represented in a lump sum in the year the capital will first be required, or spread out in equal lumps over a relatively short time. This method which results in graphs showing erratic changes from year to year was used because of timing uncertainties associated with regulatory implementation and the demand for capital. In practice, regulations will phase in, imposing smoother demands for capital over a 5 to 10 year compliance period.

Table 8
New Regulations That Impose Local Costs
(Included in the Cost Analysis)

Regulation	Status
A. DRINKING WATER	
Inorganic Compounds (IOCs)	In Development
Synthetic Organic Compounds (SOCs)	In Development
Volatile Organic Compounds (VOCs)	Promulgated
Fluorides	Promulgated
Lead and Copper Corrosion Control	Proposed
Lead and Copper MCL	Proposed
Coliform Monitoring	Proposed
Surface Water Treatment Rule: Filtered	Proposed
Surface Water Treatment Rule: Unfiltered	Proposed
Radionuclides	In Development
Disinfections	In Development
B. WASTEWATER TREATMENT	
Secondary Treatment of Municipal Wastewater	Promulgated
Pretreatment Requirements	Promulgated
Sewage Sludge Disposal- Technical Regulations for Use and Disposal	In Development
Stormwater Management	In Development
C. SOLID WASTE DISPOSAL	
Municipal Landfill Subtitle D	Proposed
Municipal Waste Combusters Air Standards	In Development
Municipal Waste Combusters Ash Disposal	In Development
D. MISCELLANEOUS REGULATIONS	
Underground Storage Tanks Technical Standards	Promulgated
Underground Storage Tanks Financial Standards	In Development
Asbestos in Schools Rule	Promulgated
SARA Title III Requirements	Promulgated

Appendix 2

List of Environmental Regulations Applicable to Local Governments But Not Included in the Cost Estimates

Regulation Status

A. Drinking Water

Well-head Protection Plan	In Development
Pesticides in Groundwater	In Development
Disinfection By-products	In Development

B. Wastewater Treatment

National Estuary Program	In Development
Wetlands Protection Program - 404(c) permits	Promulgated
Nonpoint Source Regulations	In Development
Guidance/Mgmt. Plans	
Section 304(1) - Toxics in Water Bodies	In Development

C. Solid Waste Disposal

National Contingency Plan - Superfund Program	In Development
Low-Level Radiation Waste Standards	In Development

D. Miscellaneous Regulations

Heavy Duty Diesel Vehicles	Promulgated
Gasoline Marketing	In Development
Diesel Fuel Standards	In Development
Revisions to National Ambient Air Quality Standards (Ozone, Carbon Monoxide, Particulate Matter, Nitrogen Oxides, Sulfur Oxides)	In Development
Asbestos in Public Buildings	May be Required
Asbestos Ban and Phasedown	In Development

Appendix 3

Tables of Data

Figure 1
Projected EPA, State, and Local Government Expenditures to
Maintain Existing Levels of Environmental Quality Compared to
Current Environmental Expenditures (Millions of 1988 Dollars)

Year	Total	Spending to Maintain Existing Levels of Environmental Quality in Addition to Existing Expenditures (1987)
1981	\$34,608	\$0
1982	\$33,293	\$0
1983	\$34,316	\$0
1984	\$34,765	\$0
1985	\$36,958	\$0
1986	\$39,312	\$0
1987	\$39,749	\$0
1988	\$41,160	\$1,411
1989	\$45,508	\$5,759
1990	\$46,478	\$6,729
1991	\$50,418	\$10,669
1992	\$50,240	\$10,491
1993	\$50,115	\$10,367
1994	\$49,956	\$10,207
1995	\$49,814	\$10,065
1996	\$50,957	\$11,208
1997	\$52,078	\$12,329
1998	\$53,178	\$13,429
1999	\$54,258	\$14,509
2000	\$55,320	\$15,571

Figure 2
EPA, State and Local Government Expenditures to Maintain Current Levels of
Environmental Quality, by Media, 1981-2000
(In Millions of 1988 Dollars)

Year	Air	DW	WQ	SW	Others	Total
1981	\$887	\$12,253	\$15,647	\$4,984	\$837	\$34,608
1987	\$896	\$15,002	\$16,339	\$6,056	\$1,456	\$39,749
2000	\$867	\$21,906	\$20,339	\$8,336	\$3,873	\$55,320

Figure 3
Percentage of EPA, State and Local Government Expenditures
By Environmental Service, to Maintain Current Levels of Environmental Quality,
By Media, 1981-2000

Year	Air	DW	WQ	SW	Others	Total
1981	3%	35%	46%	14%	2%	100
1987	2%	38%	41%	15%	4%	100
2000	2%	40%	36%	15%	7%	100

Figure 4
Public Expenditures (Capital and O&M), By Level of Government, to Maintain
Current Levels of Environmental Quality
(In Billions of 1988 Dollars)

Year	EPA		STATE		LOCAL		TOTAL	
	Amount	Percent Share	Amount	Percent Share	Amount	Percent Share	Amount	Percent Share
1981	\$6.3	18%	\$2.0	6%	\$26.3	76%	\$34.6	100%
1987	\$5.0	13%	\$2.1	5%	\$32.6	82%	\$39.7	100%
2000	\$4.3	8%	\$2.6	5%	\$48.4	87%	\$55.3	100%

Figure 5
Proportion of Environmental Outlays (Capital and O & M), By Level of
Government, to Maintain Current Levels of Environmental Quality, 1981, 1987,
and 2000 (In Millions of 1988 Dollars)

Year	EPA		STATE		LOCAL		TOTAL	
	Amount	Percent Share	Amount	Percent Share	Amount	Percent Share	Amount	Percent Share
1981	\$6,276	18%	\$1,992	6%	\$26,340	76%	\$34,608	100%
1987	\$5,036	13%	\$2,132	5%	\$32,581	82%	\$39,749	100%
2000	\$4,293	8%	\$2,602	5%	\$48,424	87%	\$55,319	100%

Figure 6
Projected Local Government Expenditures to Maintain Current Levels of
Environmental Quality and Comply with New Environmental Standards
(In Millions of 1988 Dollars)

Year	Current Level of Local Spending	Additional Spending to Maintain Current Environmental Quality	Additional Spending to Comply with Standards
1981	\$26,340	\$0	\$0
1982	\$25,680	\$0	\$0
1983	\$27,677	\$0	\$0
1984	\$28,399	\$0	\$0
1985	\$30,029	\$0	\$0
1986	\$32,036	\$0	\$0
1987	\$32,581	\$0	\$0
1988	\$34,068	\$1,487	\$2,362
1989	\$37,933	\$5,352	\$2,986
1990	\$38,973	\$6,392	\$3,411
1991	\$42,520	\$9,939	\$3,874
1992	\$42,857	\$10,276	\$6,985
1993	\$43,223	\$10,642	\$4,111
1994	\$43,542	\$10,961	\$4,665
1995	\$43,859	\$11,278	\$4,815
1996	\$44,810	\$12,229	\$4,970
1997	\$45,740	\$13,159	\$5,750
1998	\$46,652	\$14,071	\$5,542
1999	\$47,546	\$14,965	\$6,677
2000	\$48,424	\$15,843	\$5,297

Figure 7
Local Government Expenditures to Maintain Current Levels of Environmental Quality and to Comply with New Environmental Standards, by Media

Drinking Water				Water Quality			
Year	Current ^a Programs (1988 \$MM)	New Programs (1988 \$MM)	Total (1988 \$MM)	Year	Current Programs (1988 \$MM)	New Programs (1988 \$MM)	Total (1988 \$MM)
1981	\$12,073	\$0	\$12,073	1981	\$9,086	\$0	\$9,086
1982	\$12,087	\$0	\$12,087	1982	\$8,309	\$0	\$8,309
1983	\$12,547	\$0	\$12,547	1983	\$9,693	\$0	\$9,693
1984	\$12,533	\$0	\$12,533	1984	\$10,169	\$0	\$10,169
1985	\$13,625	\$0	\$13,625	1985	\$10,295	\$0	\$10,295
1986	\$14,873	\$0	\$14,873	1986	\$10,967	\$0	\$10,967
1987	\$14,816	\$0	\$14,816	1987	\$11,376	\$0	\$11,376
1988	\$15,348	\$0	\$15,348	1988	\$12,148	\$2,052	\$14,200
1989	\$15,879	\$1	\$15,880	1989	\$15,288	\$2,130	\$17,418
1990	\$16,411	\$24	\$16,435	1990	\$15,605	\$2,266	\$17,871
1991	\$16,942	\$26	\$16,968	1991	\$18,433	\$2,305	\$20,738
1992	\$17,474	\$35	\$17,509	1992	\$18,054	\$2,506	\$20,560
1993	\$18,005	\$94	\$18,099	1993	\$17,710	\$2,499	\$20,209
1994	\$18,537	\$539	\$19,076	1994	\$17,322	\$2,574	\$19,896
1995	\$19,068	\$580	\$19,648	1995	\$16,938	\$2,650	\$19,588
1996	\$19,600	\$625	\$20,225	1996	\$17,192	\$2,725	\$19,917
1997	\$20,131	\$1,296	\$21,427	1997	\$17,429	\$2,800	\$20,299
1998	\$20,663	\$951	\$21,614	1998	\$17,651	\$2,875	\$20,526
1999	\$21,194	\$1,030	\$22,224	1999	\$17,858	\$2,951	\$20,809
2000	\$21,726	\$497	\$22,223	2000	\$18,052	\$3,026	\$21,078

Solid Waste			
Year	Current ^a Programs (1988 \$MM)	New Programs (1988 \$MM)	Total (1988 \$MM)
1981	\$4,948	\$0	\$4,948
1982	\$5,043	\$0	\$5,043
1983	\$5,163	\$0	\$5,163
1984	\$5,384	\$0	\$5,384
1985	\$5,771	\$0	\$5,771
1986	\$5,858	\$0	\$5,858
1987	\$6,050	\$0	\$6,050
1988	\$6,233	\$0	\$6,233
1989	\$6,426	\$0	\$6,426
1990	\$6,617	\$0	\$6,617
1991	\$6,804	\$357	\$7,161
1992	\$6,987	\$3,194	\$10,181
1993	\$7,166	\$1,035	\$8,201
1994	\$7,340	\$1,069	\$8,410
1995	\$7,510	\$1,104	\$8,614
1996	\$7,675	\$1,138	\$8,813
1997	\$7,836	\$1,172	\$9,009
1998	\$7,994	\$1,234	\$9,228
1999	\$8,150	\$1,297	\$9,447
2000	\$8,302	\$1,361	\$9,663

^a Includes costs to deliver services.

Figure 8
Total Capital Expenditures by EPA, States and Local Governments, to Maintain
Current levels of Environmental Quality and Local Capital Spending to
Comply with New Regulations, 1981-2000 (In Millions of Dollars)

Year	Total Capital Expenditures to Maintain Current Levels of Environmental Quality	Local Capital Costs to Comply with New Regulations
1981	\$13,274	\$0
1982	\$11,334	\$0
1983	\$11,399	\$0
1984	\$11,010	\$0
1985	\$12,205	\$0
1986	\$13,468	\$0
1987	\$12,935	\$0
1988	\$13,267	\$2,199
1989	\$16,433	\$2,881
1990	\$16,718	\$2,994
1991	\$19,749	\$3,313
1992	\$18,640	\$5,892
1993	\$17,574	\$2,177
1994	\$16,550	\$2,617
1995	\$15,567	\$2,610
1996	\$15,892	\$2,597
1997	\$16,217	\$3,209
1998	\$16,541	\$2,774
1999	\$16,865	\$3,707
2000	\$17,188	\$2,110

Figure 9
Local Capital Expenditures to Maintain Current Levels of Environmental Quality
and to Comply with New Regulations, 1981 - 2000
(In Millions of 1988 Dollars)

Year	Current Capital Expenditures	New Capital Costs	Total Capital
1981	\$8,374	\$0	\$8,374
1982	\$6,877	\$0	\$6,877
1983	\$7,883	\$0	\$7,883
1984	\$7,853	\$0	\$7,853
1985	\$8,650	\$0	\$8,650
1986	\$9,810	\$0	\$9,810
1987	\$9,547	\$0	\$9,547
1988	\$10,262	\$2,199	\$12,461
1989	\$13,379	\$2,881	\$16,260
1990	\$13,689	\$2,994	\$16,683
1991	\$16,517	\$3,313	\$19,830
1992	\$16,112	\$5,892	\$22,004
1993	\$15,728	\$2,177	\$17,905
1994	\$15,366	\$2,617	\$17,983
1985	\$15,024	\$2,610	\$17,634
1996	\$15,337	\$2,597	\$17,934
1997	\$15,650	\$3,209	\$18,859
1998	\$15,962	\$2,774	\$18,736
1999	\$16,275	\$3,707	\$19,982
2000	\$16,587	\$2,110	\$18,697

Figure 10
Local Governmental Capital and O&M Expenditures to Maintain Current Levels of
Environmental Quality and to Comply with New Regulations
(In Millions of 1988 Dollars)

Year	Local Capital	Local O&M	Local Total
1981	\$8,374	\$17,966	\$26,340
1982	\$6,877	\$18,803	\$25,680
1983	\$7,883	\$19,794	\$27,677
1984	\$7,853	\$20,546	\$28,399
1985	\$8,650	\$21,379	\$30,029
1986	\$9,810	\$23,034	\$32,581
1988	\$12,461	\$23,969	\$36,430
1989	\$16,260	\$24,659	\$40,919
1990	\$16,683	\$25,700	\$42,384
1991	\$19,830	\$26,564	\$46,394
1992	\$22,004	\$27,838	\$49,842
1993	\$17,905	\$29,429	\$47,334
1994	\$17,983	\$30,224	\$48,207
1985	\$17,634	\$31,040	\$48,674
1996	\$17,934	\$31,846	\$49,781
1997	\$18,859	\$32,631	\$51,490
1998	\$18,736	\$33,459	\$52,195
1999	\$19,982	\$34,242	\$54,223
2000	\$18,697	\$35,017	\$53,714

Figure 11
Comparison of EPA and Local Government Capital Expenditures
(In Millions of 1988 Dollars)

Year	EPA Capital Outlays	Local Capital Outlays
1981	\$4,511	\$8,374
1982	\$4,071	\$6,877
1983	\$3,250	\$7,883
1984	\$2,848	\$7,853
1985	\$3,126	\$8,650
1986	\$3,258	\$9,810
1987	\$2,967	\$9,547
1988	\$2,566	\$12,461
1989	\$2,362	\$16,260
1990	\$2,325	\$16,683
1991	\$2,288	\$19,829
1992	\$1,689	\$22,004
1993	\$1,108	\$17,905
1994	\$545	\$17,983
1985	\$0	\$17,635
1996	\$0	\$17,934
1997	\$0	\$18,859
1998	\$0	\$18,736
1999	\$0	\$19,982
2000	\$0	\$18,696

Appendix 4

Differences in Methodology and Content Between the Municipal Sector Study and This Report

1. The Municipal Sector Study (MSS) estimates local costs associated with new regulations assuming that costs of existing environmental regulations remain constant over the period studied, 1988 to 1996. This report (Cost Report) incorporates these data and, in addition, provides data on expenditures pursuant to current regulations. For the Cost Report, local expenditures pursuant to existing regulations are provided for 1981 to 1986 and projected to the year 2000 to estimate local costs of existing regulations. Tables indicating costs to municipalities and households in year 2000 include both costs of maintaining current programs and costs of new regulations.
2. The final years of cost projection differ for the two studies. For the MSS it is 1996 and for the Cost Report it is 2000. While the MSS discusses future costs for 1996, this report compares 1987 with 2000.
3. All data in the MSS are presented in 1986 dollars and for the Cost Report they are presented in 1988 dollars.
4. Capital costs were amortized using different methods. The MSS used a 10 percent real rate. The Cost Report assumed a 3 percent real rate.
5. The MSS reports costs in fewer size categories than the Cost Report. The large expenditures estimated for households in the smallest cities (<500) in the Cost Report are reduced considerably when averaged across households in cities with <2,500 people (the smallest size category in the MSS). This is also true when calculating expenditures as a percentage of household income.
6. Average costs per household are calculated in the MSS based on a survey of household user charges for environmental services whereas in the Cost Report household costs are based on necessary expenditures per household to provide the services. This difference in methodology results in different cost estimates because revenues from charges do not necessarily equal expenditures to provide a service. In addition, costs of provision vary between cities — even for communities of comparable size. Finally, the use of different surveys contributes an additional source of variation. The MSS data are based on survey results gathered specifically for the MSS project. Data in the Cost Report are based on survey results gathered by the Office of Drinking Water and the U.S. Census Bureau.

Appendix 5

Average Annual Household User Charges for Environmental Services in 1987 (1988 Dollars)

Municipality Size Category	Drinking Water	Water Quality	Solid Waste	Total
500 or less	\$304	\$304	\$62	\$670
500 - 2,500	\$210	\$213	\$50	\$473
2,500 - 10,000	\$191	\$174	\$68	\$433
10,000 - 50,000	\$182	\$184	\$78	\$444
50,000 - 100,000	\$150	\$143	\$80	\$373
100,000 - 250,000	\$126	\$106	\$59	\$291
250,000 - 500,000	\$127	\$92	\$116	\$335
500,000 or more	\$108	\$100	\$185	\$393
Weighted Average	\$172	\$164	\$83	\$419

Source: Apogee Research from data compiled by the U.S. Bureau of the Census and 1986 Survey of Community Water Systems, conducted by the Research Triangle Institute for the Environmental Protection Agency, Office of Drinking Water, October 23, 1987.

Appendix 6

Sources of Data for Figures Used in Reports

Figures 1 through Figure 5:
Apogee Research projections from the following:

U.S. Bureau of the Census, *Government Finances* (various years); Bureau of Economic Analysis, *Pollution Abatement and Control Expenditures* (various years); Bureau of the Census, *Pollution Abatement Cost and Expenditure Survey* (various years); U.S. EPA, *Justification of Appropriation Estimates for Committee on Appropriations* (various years).

Figures 6 through Figure 11:
Apogee Research projections from the following:

U.S. Bureau of the Census, *Government Finances* (various years); Bureau of Economic Analysis, *Pollution Abatement and Control Expenditures* (various years); Bureau of the Census, *Pollution Abatement Cost and Expenditure Survey* (various years); U.S. EPA, *Justification of Appropriation Estimates for Committee on Appropriations* (various years); and data prepared by the Environmental Law Institute from Regulatory Impact Analyses for the water quality and solid waste programs. Costs of new regulations for the drinking water program are from the preliminary analysis for the "Estimates of the Total Benefits and Total Costs Associated with the 1986 Amendments to the Safe Drinking Water Act", November, 1989.

End Notes

Executive Summary

- ¹ *The Municipal Sector Study: Impacts of Environmental Regulations on Municipalities*, Office of Policy, Planning, and Evaluation, U.S. Environmental Protection Agency (September 1988). See Appendix 4 for an explanation of the differences between the methodology and content of the Sector Study and this report.
- ² The Clean Air and Water Acts require that EPA report to Congress every five years estimating the costs of carrying out the respective acts. The next report will be submitted in 1990.
- ³ *State Funding Study, Details of State Needs, Funding, Funding Gap*, U.S. Environmental Protection Agency (August 8, 1988). Trends in the State Funding Study were extended from 1995 to 2000 in order to provide consistent data for this report.
- ⁴ EPA, Municipal Sector Study (September 1988).

Assumptions for Projections

- ⁵ *Determining and Addressing Critical Environmental and Resource Challenges Facing EPA and Society*, Draft Report on Current Expenditures for Compliance with Federal Mandates. Office of the Comptroller, U.S. Environmental Protection Agency, August 22, 1988.

Chapter 1

- ⁶ Appendix 1 describes the methodologies used in estimating future costs.
- ⁷ National Council on Public Works Improvement, *Fragile Foundations: A Report on the Nation's Public Works* (February 1988). The National Council on Public Works Improvement reported a steady increase in net depreciated capital assets from 1960 to 1987 for drinking water and wastewater treatment services, with asset bases increasing by 2.5 percent each year for drinking water and by 4.4 percent each year for wastewater treatment. While some of this investment is due to higher quantity and levels of service, it is clear that new additions to the capital stock have outpaced the depreciation of existing plants and equipment.
- ⁸ The Clean Air Act was last reauthorized in 1976 and most of the regulations attributable to the clean air program have had their major cost effects already. Congress is now debating a new Clean Air Act, which undoubtedly will impose new costs on governments and the private sector. That these costs cannot be included in this study probably underestimates the projected outlays for air quality control.
- ⁹ The "other" category also includes the Leaking Underground Storage Tanks Program, interdisciplinary studies, administration within EPA, plus EPA programs in energy, radiation, pesticides, and toxic substances.

- ¹⁰ 1988 Needs Survey Report to Congress: Assessment of Publicly-Owned Wastewater Treatment Facilities in the United States, USEPA (February 1987).
- ¹¹ R.W. Beck and Associates, *The Nation's Public Works: Report on Solid Waste Management*, prepared for the National Council on Public Works Improvement (May 1987).
- ¹² See Council of State Governments, *Resource Guide to State Environmental Management*, Lexington, Kentucky (1988).
- ¹³ *State Funding Study, Details of State Needs, Funding, Funding Gap*, U.S. Environmental Protection Agency (August 8, 1988).
- ¹⁴ Congressional Budget Office, *Environmental Federalism: Allocating Responsibilities for Environmental Protection*, Staff Working Paper (September 1988).
- ¹⁵ Estimates were prepared by the Environmental Law Institute from data abstracted from Regulatory Impact Analyses prepared for EPA's major pending rules.
- ¹⁶ US EPA, op cit., 1988 Need Survey Report to Congress.

Chapter 2

- ¹⁷ Other Federal aid that can be used for local wastewater treatment works include Farmers Home Administration water and sewer grants and loans and Economic Development Administration grants to under-developed regions.
- ¹⁸ Some states such as New York plan to meet the shortfall with highly leveraged SRFs. That is, the original capitalization will be used to secure bonds, raising up to five times the amount available for loans in the original capitalization grants.
- ¹⁹ For details, see Apogee Research, Inc. *The Nation's Public Works: Report on Wastewater Management*, prepared for the National Council on Public Works Improvement (May 1987).
- ²⁰ See, R.W. Beck and Associates, *Report on Solid Waste*.
- ²¹ For details, see Apogee Research, Inc. and Wade Miller Associates, Inc., *Problems in Financing and Managing Smaller Public Works*, prepared for the National Council on Public Works Improvement (September 10, 1987).
- ²² EPA, *Municipal Sector Study* (September 1988).

Chapter 3

- ²³ See Appendix 4 to this report for an explanation of differences in methodology between this report and the Municipal Sector Study.
- ²⁴ Cities were divided into the following population-size categories: less than 500; 500 - 2500; 2500 - 10,000; 10,000 - 50,000; 50,000 - 100,000; 100,000 - 250,000; 250,000 - 500,000; more than 500,000.

Appendix 1

- ²⁵ EPA is collecting data for the 1990 Report to Congress, The Cost of Clean Air and Water. In addition to the data provided in the present report, The Cost of Clean Air and Water will include federal non-EPA expenditures and environmental expenditures by private industry associated with current and new regulations.

- ²⁶ The following programs are included: construction grants, state revolving fund capitalization grants, water quality, hazardous waste, solid waste, Superfund, air quality, drinking water, toxic substances, pesticides, energy, radiation, underground storage tanks, management and support, and interdisciplinary.
- ²⁷ Appendix 2 to this report presents a list of the pending regulations applicable to local governments but not included in the cost analysis.
- ²⁸ Including the 1984 Hazardous and Solid Waste Amendments to the Resource Conservation and Recovery Act (HSWA), the 1986 Superfund amendments (SARA), the 1986 Safe Drinking Water Act amendments, and the 1987 amendments to the Clean Water Act.