# MEETING TOMORROW'S ENVIRONMENTAL INFRASTRUCTURE CHALLENGE

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## Introduction

In 1988 the National Council on Public Works Improvement completed its two-year mission of analysis and review for the President and the Congress. The Council's final report, Fragile Foundations,' was a call to arms for renewed public and private attention to public works —before it is too late. Not surprisingly, the Council found that our environmental and transportation systems are "barely adequate," even for today's needs. Unless we change course dramatically —and soon — our public works will be "insufficient to meet the demands of future economic growth."

Overall, the nation earned a grade of "C minus" for public works — hardly something the world's largest industrial power can be proud of. Hazardous waste management facilities earned only a "D" — the lowest grade of all, while water supply reached as high as a "B minus" and water resources received the highest grade of all, a "B." Wastewater and solid waste received a "C" and a "C minus" respectively. Most tangibly, the Council called for at least a doubling of spending on capital improvements — $50 billion more a year for starters. About half of that increase would be for highways.

Public works are an everyday necessity. They get us to and from work, provide a cool drink of water on a hot day, allow us a wide range of recreational options, and get raw materials to factories and finished products to market. Environmental projects, in particular, have another important goal— they impact the quality of the environment in which we live as well as our health and the health of ecosystems.

The importance of public works, however, goes beyond these factors. Public works build economic productivity and productivity generates economic wealth. For example, studies conducted by Dr. David Aschauer of the Federal Reserve Bank of Chicago show a direct link between the decline in public investment and the decline in total productivity. Indeed, he has shown that more than one-half of the nation's drop in economic productivity can be traced to the drop in public investment.[2] The most significant single factor in the recent decline in U.S. productivity has been the drop in public works investment. In other words, building better roads, treatment plants, and Water purification systems is not pork barrel. They are the bones and muscle that allow the rest of the economy to prosper.

This paper provides a review of public works spending, with a focus on the need for funding of environmental programs through the year 2000 and beyond. One conclusion is clear: additional funding of environmental programs is necessary to maintain the current level of environmental quality. Further improvements will require still more resources. To meet this challenge, innovative financing techniques will be required. Additional funding from traditional mechanisms, such as taxes and user fees, will also be necessary.

1 *Fragile Foundations: A* Report *on America's Public Works,* National Council Puthc Woài Improvement, February 1988.

2 *Public *Investment* and Productivity Growth in the Group of seven," in *Economic Perspectives,* David Aschauer, Federal Reserve Bank of Chicago, September/October, 1989.

Aschauer's definition of public investment is somewhat tease, than pun public works, and includes housing end schools, but public works accounts for uses than 70 percent of the total mad he uses the two interchangeably.

## Public Works Spending: Past and Future

For the past twenty years, the U.S. has steadily devoted less and less of our resources to public infrastructure. From 3.7 % of our gross national product in the early 1960s, public works accounts for only 2.6 % of GNP today.

Furthermore, while routine maintenance has kept pace with the economy, capital spending has dropped almost out of sight — from 2.4 % of GNP in the early 1960s to 1.2 percent today. Capital builds new facilities, but it also restores existing stock, thus when capital drops, so does the quality of our baseline public works. When these numbers are adjusted for depreciation, we have been investing less than *0.5%* of our GNP for some fifteen years. Of the developed world, only Great Britain comes close to this dismal record. Net of depreciation, Japan devotes four to six percent of its GNP in public investment. Even with more than one trillion dollars of net investment in public works, how long can we live off the past?

Environmental programs, a major component of public infrastructure spending, have fared better than average over the past twenty years. While investment in our transportation future nearly stopped in the 1960s and early 1970s, environmental investments did not level off until the 1980s. Currently, annual expenditures on environmental programs at the federal, state, and local level are approximately $40 billion,[3] divided among the major environmental programs as follows:

- Water quality (including wastewater treatment) —40 %;
- Drinking water —*35 %;*
- Solid waste — 14 %;
- Air quality —3 %;
- Other programs —2 *%*.

A number of factors will affect the level of future spending on environmental programs and who will foot the bill. Three trends stand out.

## Future Costs Will Significantly Exceed Current Spending Levels

In 1987 state, local, and federal government together spent $40 billion for environmental protection, compared to $31 billion a year a decade earlier. If recent trends continue, it will be necessary to increase spending by nearly 40 % to over *$55* billion per year by the year 2000 simply to maintain 1987 levels of environmental quality. In addition to the funds required to maintain 1987 levels of environmental quality, we estimate that *$5.3* billion a year is the amount of local government spending needed to comply with twenty-two new environmental regulations by the year 2000.

Together, these gaps represent a difference of nearly $21 billion between what government spent in 1987 and what we expect them to spend in 2000 for environmental protection. In other words, a 50 % increase in environmental spending is needed over the next ten years to comply with current regulations.

The gap could narrow if we are more efficient in meeting environmental goals. However, these estimates are conservative, since they do not include the costs to EPA and the states of many new regulations under development, the costs associated with the future congressional mandates (such as the forthcoming reauthorization of the Clean Air Act), and the growing number of new state and local environmental mandates.

## The Local Share of Public Environmental 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 % of the government share of environmental costs. By the year 2000, localities will need to spend over $48 billion to maintain 1987 levels of environmental quality and will bear 87 % of government costs for environmental protection. Adding in the $5.3

3 AU dollar figures in this paper are expressed as 1988 dollars unless otherwise trend.

billion a year in expenditures to meet new regulations increases the local share to nearly 90 %.

Although little is known about future state outlays for environmental programs, trends identified in a recent EPA study suggest that by the year 2000, states will need to spend more than twice the amount spent in 1987 to administer water programs.[4] State administrative costs could triple by 2000 if the air and solid waste programs impose similar demands.

These increases are attributable to three factors. First, state and local spending is increasing due to the phasing-out of EPA grants to build wastewater treatment plants. Second, the cost of providing a base level of environmental protection to a growing population obviously increases as the population increases. But beyond these factors, real-dollar outlays for environmental protection have outpaced inflation in response to demands by the American public for cleaner waters, safer drinking water, and more responsible handling of municipal garbage. For example, the average real dollar cost per person of operating the nation's wastewater treatment plants has more than doubled from $15.80 in 1960 to $37.20 in 1984.

Household Costs in Small Communities Will Increase Dramatically

Costs to households of environmental regulations are measured by increased user charges, increased general taxes, and/or reduced levels of services in other municipal programs. There are also indirect costs, such as when private industries pass their share of environmental costs to households in the form of price increases for goods and services.

The annual real cost of environmental programs for the average household is expected to increase by 54 % 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 five hundred people they will more than double, from $670 in 1987 to $1,58*0* 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 five hundred population), for whom expenditures are expected to increase from 2.8 % to *5.6 %* of household income between the years 1987 and 2000. On average, impacts are much less for households in all other city size categories, with projected increases from about one-half percentage point to 1.8 % of household income by the year 2000.

**Where do We Look for Solutions?**

Demand for environmental services coupled with tight fiscal resources has spawned two innovations: public-private partnerships and state revolving loan funds. We also suggest a third approach — state chartered solid waste facilities corporations. Each has a potentially large role to play in environmental finance in the future.

Public and Private Partnerships

As communities across the country have faced the high costs of building environmental projects and reduced availability of federal funds, a search has begun for alterative approaches to project construction and finance. Some communities have found that cooperation between the public and private sectors has facilitated completion of needed environmental projects. These public-private partnerships are defined as any arrangement in which responsibility is shared for at least one stage of the project: proposal, selection, financing, design, construction, ownership, or operation. Benefits from public-private partnerships can include reduced project costs, faster project completion, guaranteed performance, and possibly, assistance with project financing.

Public-private partnerships can achieve cost savings over projects built under some govern-

***4 State Funding study, Details of State Needs,Funding Gap,*** U.S. Environmental Protection Agency (August 8,1958). Trends in the State Funding Study were extended from 1995 to 2000 in order to provide consistent data for this report.

ment programs. A realistic expectation for cost savings from public-private partnerships developed after the Tax Reform Act of 1986 is 10 to 15 %, with 20 % savings an upper bound in most cases. Few of the public-private partnerships built since 1986 have included cash equity in any of the wastewater facilities constructed, due to the removal of tax credits and accelerated depreciation from the tax laws. Nevertheless, some projects are under way which were initiated after the 1986 tax reform. These projects customarily include construction of a facility by a private firm for a fixed price coupled with a cash-backed plant operation agreement for up to twenty years. Typically, financing is provided by the public agency and environmental performance is guaranteed by the private partner.

Three examples of public-private partnership projects initiated after the 1986 changes in the tax law are wastewater facilities built in Mount Vernon, Illinois; Edgewater, New Jersey; and Clinton, Kentucky[5]. In Edgewater, New Jersey, a 6-MOD secondary plant has been completed for $9.9 million. The original budget was expected to be $16 million if constructed under the guidelines for the EPA Construction Grants Program. By using a public-private partnership, the plant was completed sooner and at the same price as if a State Revolving Fund loan had been used. In Mount Vernon, Illinois, a secondary plant was built for $3 million less than the lowest cost public construction alternative. The plant was completed less than a year after the contract was signed with a construction firm. It is meeting BOD and effluent requirements by wide margins. The State of Kentucky has a wastewater privatization law which was used successfully by the community of Clinton, Kentucky to build a 3000 gallon per day wastewater treatment facility. The facility cost was 30 % less than an EPA grant plant would have cost.

**State Revolving Loan Funds**

Another place to look is the State Revolving Loan Fund program, established under Title VI of the 1987 amendments to the federal Clean Water Act. The SRF, as it is know these days, receives federal grants and matches them twenty cents on the dollar. These funds are then repackaged as loans to communities at interest rates that range from 4 to 8 percent. As loan payments come in, they are re-lent to fund new projects, and so the fund revolves — in perpetuity barring defaults. Some states' SRFs are designed to leverage the initial capitalization by borrowing against the grants and a portion of the anticipated loan payments. Such schemes can increase funding velocity by a factor of 2 or even 3. By using SRF funds to guarantee or ensure local debt, funding velocity can be increased by a factor of 10 over straight grants-in, loans-out arrangements.

Why not expand this concept to fund more types of local public works? Infrastructure banks are not a new idea. Texas has had one since 1957 and Ohio since 1968. Louisiana's is three years old. An expanded infrastructure bank would not be a free lunch — but it would be a very cost-effective lunch.

Solid Waste Facilities Corporations

State-supported solid waste partnerships with private vendors through a solid waste facilities corporation represents a third solution. These new state-chartered entities could be responsible for promoting the development of integrated solid waste management facilities across the state, in locations and sizes that suit natural demographic service areas.

Facilities would be designed to accept garbage from a wide area (countywide systems are probably inefficient in most areas), separate the feedstocks, recycle materials as the markets allow, incinerate residuals, and generate steam or elec-

5 future examples of public-private partnerships foe water, wastewater, and sold waste can be found in *public-private partnership Case studies Profiles of Successes is providing* Environmental *Services*, prepared by Apogee Research, U.S. EPA. September. 1989.

tricity as by-products. Revenues would accrue from tipping fees, the sale of recovered materials and/or products, and the sale of steam or electricity. Secondary products such as recycled plastic products, paper, glass, or rubber could be produced in co-located plants, financed and leased in the same manner as the waste management facilities. Such a complex might take the form of a solid waste industrial park. To add revenue to the transaction, facilities might consider accepting municipal wastewater sludge to mix with refuse for composting. The final product could be sold as a soil conditioner.

The state would be responsible for providing the land for such facilities and financing the capital plant. Private vendors would be responsible for designing individual unit processes, operating them, and guaranteeing performance. Individual communities would commit to long-term contracts (as allowable under some state privatization statutes) to deliver their refuse of a certain mix and in a certain quantity. As a condition of entering into such a contract, each community would have to develop a source reduction and separation program with measurable milestones that would be approved by the state (many communities are already well on their way toward such a program).

States have several options to finance such facilities. The most obvious is revenue bonds secured by franchise fees pledged by private operators (ultimately secured by tipping fees paid by households and businesses in participating communities). A second option is lease-purchase financing. A third option is a pooled financing for the participating communities.

Perhaps a more innovative alternative is to sell units of capacity to waste-hauling firms, whose livelihood depends on adequate disposal capacity. In exchange for cash, haulers would receive the right to future capacity in the integrated waste management, facility once built. Such rights would be marketable during the useful life of the facility in a market that the state would operate. Presumably, such rights would increase in value as available disposal capacity grew scarce (as it would if only a limited number of adequately sized facilities were constructed).

**Conclusion**

To maintain environmental quality and meet recently enacted regulations, environmental spending must increase by *50%* in real dollars over the next ten years. This will be a challenge to all levels of government. Environmental programs will face keen competition for funds with other important programs. In this day and age in which everyone in Washington and in many states and localities live in fear of the “T’ word, it may appear that funding for these environmental programs would be nearly impossible to come by. Recent evidence suggests, however, that the public may be more supportive of such expenditures than we think.

The public, as the everyday customer of our water systems and our highways is more aware of the problems our political leaders have been avoiding. Last year some 349 bond referendums were approved, totaling some $14 billion in new public investment, much of it for public works.

This is more than twice the total approved in the two previous years. This is good news indeed, because even with assistance from innovative programs such as public-private partnerships and revolving loan funds, additional money must be raised. Money must be raised to pay for plants built through public-private partnerships. Money must be raised to repay loans from state revolving loan funds. Money must be raised for a wide variety of environmental programs if this nation is to maintain and improve the level of environmental quality we demand.