

**NEW DIRECTIONS FOR THE
NATION'S PUBLIC WORKS**

**The Congress of the United States
Congressional Budget Office**

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PREFACE

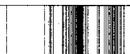
Concern is widespread over the condition of the nation's public works infrastructure. At the request of Senator Lawton Chiles, Chairman of the Senate Budget Committee, this study assesses the federal programs for highways, mass transit, aviation, waterways, and wastewater treatment, and discusses policies that the Congress might consider to improve the effectiveness of these programs. In keeping with the mandate of the Congressional Budget Office to provide objective analysis, it makes no recommendations.

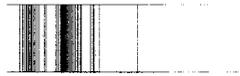
This study also fulfills the requirement of Public Law 98-501 that the Congressional Budget Office review the findings of the National Council on Public Works Improvement. The body of this paper considers some of the broader issues raised by the Council's final report, *Fragile Foundations: A Report on America's Public Works* (1988); the appendix focuses more specifically on the Council's findings.

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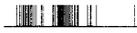
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SUMMARY AND INTRODUCTION

The importance of the nation's public works infrastructure has been demonstrated recently by mounting delays in highway and air travel and by dramatic episodes such as the closing of the Williamsburg Bridge in New York City. While concern for the state of infrastructure is widespread, no consensus yet exists on how to improve the effectiveness of infrastructure programs or how to pay for them. This report examines ways to reconcile the need for a sound infrastructure with the Congress's commitment to fiscal restraint.

In the last three decades, the federal government has greatly expanded its role in providing public works infrastructure. While continuing its century-old commitment to build major water resources projects, the government has also subsidized state and local investment in transportation and in environmental facilities. By 1988, federal infrastructure outlays totaled \$26.6 billion (see Summary Table).

Over the years, the Congress has periodically assessed the adequacy and efficiency of these programs. Recently, the focus of the reviews has shifted from the problems and prospects of individual programs to issues common to infrastructure policies generally. In 1983, for example, the Joint Economic Committee of the Congress conducted a wide-ranging survey of the nation's infrastructure problems. In 1984, the Congress established the National Council on Public Works Improvement to assess the state of the infrastructure. The Congressional Budget Office is required by Public Law 98-501 to review the findings of this Council. Accordingly, the study reviews some of the issues raised by the Council's final report, *Fragile Foundations: A Report on America's Public Works* (1988); the appendix focuses more specifically on the Council's findings.

Two difficulties arise in attempting an overall assessment of infrastructure programs. The first is the difficulty of defining infrastructure. This report analyses five major infrastructure modes--highways, aviation, mass transit, wastewater treatment, and water transportation--that are consistent with a definition of infrastructure as those facilities that provide a foundation or basic framework for the



national economy, and in which federal policy plays a significant role. A sixth area consistent with this definition--groundwater and surface water resources--will be addressed in a future CBO report. This definition excludes some facilities often thought of as infrastructure--such as public housing, government buildings, private rail service, and schools--and some environmental facilities (such as hazardous or toxic waste sites) where the initial onus of responsibility is on private individuals.

The second difficulty arises in determining how well a particular set of policies meets the variety of objectives that governments pursue in supporting infrastructure development. Here different viewpoints enter--those of economic efficiency, social policy, and national defense, among others. This study is written from an economic perspective and appraises programs in terms of their cost-effectiveness. At the same time, it recognizes that criteria of economic efficiency may have to give way at times to social or political considerations.

SUMMARY TABLE . FEDERAL INFRASTRUCTURE SPENDING, 1988
(In billions of dollars)

Infrastructure Area	Outlays	Percent of Total
Highways	13.64	51
Mass Transit	3.50	13
Aviation	5.31	20
Water Transportation	1.17	4
Wastewater Treatment	<u>2.94</u>	<u>11</u>
Total	26.56	100

SOURCE: Congressional Budget Office.

NOTE: Excludes spending for water resources other than water transportation.

The extent to which the different infrastructure areas examined here share common characteristics is striking. While important differences exist, the infrastructure areas (or "modes") can be thought of as alike in four ways: they have *common origins*, they have made *common achievements*, they face *common challenges*, and their problems may have *common solutions*. Recognizing these common characteristics should help to set new directions for infrastructure programs.

COMMON ORIGINS

The nation's infrastructure programs were created to serve many purposes, but federal involvement was motivated by three principal concerns. First was the need for coordination. Federal programs in highways, airports, air traffic control, and inland waterways were undertaken because no other jurisdiction could plan a system of such facilities from a national perspective. If left to their own devices, for example, localities would underinvest in roads (since many of the benefits of these investments accrue to people outside their boundaries) or in air traffic control (where a single national system is needed to make commercial air transit possible). Federal programs were designed to lead localities to make investments from a national rather than a local perspective, or to make national investments where localities otherwise would have little reason to do so.

The second motivation for federal involvement was to spread the financial burden. For example, after requiring that all municipalities clean their water to a minimum standard, the federal government provided funds to help them build wastewater treatment plants that would attain this standard. Similarly, when faced with a wave of private transit financial failures in central cities, the Congress enacted a federal mass transit program to lighten the burden of putting these fleets back into operation.

A third motivation was to promote social policy goals. Inland waterways, ports, and water supply projects were all subsidized as a way of promoting or revitalizing economic development in individual regions. Mass transit was seen as part of a policy to revitalize urban

cores. Mass transit, aviation, and highways were all conceived, in part, as ways to increase the mobility of the population and to integrate the various regions of the country. In this sense, infrastructure programs have actively sought social goals as a collateral benefit of economic expansion.

COMMON ACHIEVEMENTS

The infrastructure programs share common achievements in two respects: almost all have accomplished their initial goals to a great degree, and together they have forced state and local governments to develop bureaucracies capable of planning, administering, and financing these areas of public life--so much so that many states are now widely recognized as imaginative infrastructure managers.

While all the nation's infrastructure facilities may never be "finished" since there will be ongoing needs for maintenance, expansion, and replacement, significant accomplishments have been made in all areas of infrastructure. The Interstate Highway System as currently planned is about 98 percent complete, and all funds needed for its completion will be obligated by 1993. The United States now has more highways per person than any other industrialized country; its roads are used at only about 15 percent of capacity in rural areas and 40 percent of capacity in urban areas. Water supply projects have led to the regional development of the West, so much so that the Bureau of Reclamation now believes that adequate water supplies often can be achieved more efficiently through conservation than through new construction. About 90 percent of the wastewater treatment plants needed to meet current regulatory standards have been built; as a result, the ongoing deterioration in water quality prevalent only two decades ago has been arrested.

The standard of achievement is not uniform. Mass transit programs have often encouraged localities to apply incorrect solutions to their transit problems: new systems in Miami, Washington, D.C., Pittsburgh, and Atlanta have all raised the cost of providing transit while attracting far fewer riders than predicted. Nationwide, the use of trains and buses continues to decline except for trips from suburbs to urban centers, but such trips now account for only one-seventh of

trips to work. Although the largest urban rail systems--New York City, Chicago, Philadelphia, and Boston--are in need of renovation, many smaller urban systems have more capital equipment than they can use although they are still drawing operating subsidies from the federal government. In air transportation, the antiquated traffic control system is a major source of delays, and the rapid recent growth in air traffic has brought peak-hour congestion to the airports.

The federal government's initiatives have also led state governments to become more productive partners in infrastructure management. State governments are now more capable of managing their infrastructure systems and many are widely recognized as being innovators in infrastructure finance.

COMMON CHALLENGES

The various infrastructure modes confront, each in its own fashion, similar sets of challenges. The most important of these may be the transition from an era of construction to an era of management. Just how well federal infrastructure programs perform in this new era will depend, in part, on the incentives that the programs offer to infrastructure users and to state and local infrastructure managers. Federal programs now also confront an institutional environment far different from that for which they were designed.

Management

The transition from an era of construction to one of maintenance, rehabilitation, and replacement is evident in almost all modes. In highways, for example, the rate of return on maintaining the condition of the federal-aid highway system is on the order of 30 percent to 40 percent, while the rate of return on new construction, save in certain urban areas, is very low. For aviation, the most pressing general need is to modernize the air traffic control system.

In mass transit, newly constructed systems have not reversed the decline in transit's share of commuting. Nationwide, mass transit operates at a low level of productivity, and transit fleets are too large. A

contradiction may be seen in that the older major urban systems need repair, while nationally an unobligated balance of \$850 million sits in transit accounts for lack of new construction projects that qualify for aid.

Similarly, about half of the locks and dams on the inland waterway system will have exceeded their design lives by the year 2000. Many of these locks will require major rehabilitation.

Construction is not a thing of the past, but where construction is needed (as it is to some extent in all modes), the needs are regional rather than national. Moreover, the needs are typically for alleviating congestion rather than anticipating or promoting growth. The area farthest from its initial goal may be wastewater treatment: the Environmental Protection Agency estimates the remaining need for wastewater treatment plants at a total construction cost of \$76 billion between now and 2005. Perhaps half of these outlays, however, would be needed even in the absence of federal statutes.

Incentives

As currently structured, federal infrastructure programs fail to provide either infrastructure users or state and local managers with incentives to make efficient choices. Since the benefits of using facilities are not tied to the costs of providing them, federal programs lead to inflated perceptions of the demand for infrastructure. The current programs also give state and local managers no incentives to solve infrastructure problems with "nonstructural" approaches, and often encourage them to select projects that create local, rather than national, benefits.

Infrastructure managers must not only decide what facilities to build, but also price them in a way that will optimize their use. Charging prices that are too high would lead to underuse and reduce the productivity of the infrastructure investment, while making roads, ports, and mass transit available without charge would lead to their overuse and rapid deterioration. In only two of the seven major federal programs--highways and airports--are fees now high enough to defray most of the federal spending. And even in these programs, some users--notably, operators of heavy trucks and private planes--

pay less than their share of costs, while other users--light truck operators and airline passengers--make up the difference by paying fees that recover more than the costs they create. In each of these programs, below-cost pricing leads users to request more infrastructure services than they are willing to pay for, while planners get an exaggerated perception of investment needs from these misleading signals about infrastructure demand.

Water transportation projects are conspicuous in their failure to charge users for the costs of water transportation. The 1986 Omnibus Water Resources Development Act required that user fees finance up to 50 percent of the costs of new construction, but in 1988 user fees still covered only 21 percent of the Corps of Engineers construction costs on inland waterways and 9 percent of total Corps costs for inland navigation. Thus, users of the inland water system are subsidized while those who use competing freight modes--particularly rail--are not. Water projects also deliver water that is allocated through historical rights at prices far below costs, leading to overconsumption and underinvestment in conservation. Ironically, this overconsumption of water, particularly in agriculture, increases water runoff and, in turn, water-based pollution and the need for treatment of rivers and streams.

Another set of common problems arises from the incentives given to state and local infrastructure managers. First, the structure of federal financial assistance leads state and local infrastructure managers to substitute federal funds for their own. This phenomenon of "fiscal substitution" takes place in a variety of infrastructure modes, most notably in wastewater treatment (where federal grants appear not to have led to more rapid construction of wastewater plants and may have led to actual deferrals of plant construction). Substituting federal for local funds also occurs in highway programs outside the original Interstate system (where statistical evidence suggests that federal assistance has had far less than its maximum impact).

Second, even where it has truly added to spending, federal assistance may have altered the choices made by local officials without satisfying federal interests. In mass transit, for example, where capital purchases are subsidized to a far greater extent than are maintenance expenditures, municipalities regularly retire buses before the end of their useful lives and purchase new equipment with federal

funds in excess of service requirements. In wastewater treatment, plants have commonly been built to subsidize local economic expansion rather than to service current needs.

Institutions

A final challenge that confronts all infrastructure programs is a changing institutional environment. Regions that once depended on inland water transportation now have new alternatives as a result of changing technology and the deregulation of most transportation industries. The deregulation of air travel has led to a more efficient system of "hubs and spokes" for airlines, requiring airports to be more flexible while at the same time leaving them more vulnerable to changes in airline routing. State and local governments, and the capital markets that serve them with funds, are learning how to manage and appraise infrastructure projects. In addition to the traditional general obligation bonds, many state governments now employ new devices such as bond banks, revolving loan funds, and special taxing authorities to finance their projects.

COMMON SOLUTIONS

The chapters that follow evaluate a wide range of options intended to make federal infrastructure policies more responsive to current challenges. While differing in their details, most of these options stem from four approaches: pricing infrastructure services more efficiently; targeting federal assistance more effectively; assigning more infrastructure responsibilities to states and localities; and fostering greater competition among different forms of infrastructure for federal funds. These approaches seek more cost-effective infrastructure programs. Cost-effectiveness is not the only goal of infrastructure spending, however, and sometimes may conflict with other goals such as income redistribution or the economic development of particular regions.

Pricing Infrastructure Services

Better pricing of infrastructure services--that is, more reliance on user fees--would help to achieve a number of goals. Better pricing could reveal how much people value different infrastructure services; by giving managers better information about the cost-effectiveness of different projects, user charges could enable them to improve their investment decisions. Proper pricing could also ameliorate congestion, whether that congestion is specific to particular localities (as with highways and inland waterways) or to particular times of day (as in aviation). Varying airport landing fees by time of day, for instance, would shift some traffic to off-peak hours. Similarly, user fees at locks and dams on the inland waterways systems could cause some cargo to be shipped by rail or other alternative systems.

Most existing user fees are designed simply to recover some portion of infrastructure costs. While increasing those fees could help finance infrastructure investment, it would do little to increase the efficiency of that investment. Most current fees--the highway gas tax, the inland waterways fuel tax, the harbor maintenance tax, the airline ticket tax--are the same throughout the country, although both the demand for services and the cost of providing them vary dramatically by place and time. Current fees reveal little about how users value particular facilities and thus do little to direct investment toward projects that benefit users most. Similarly, landing fees that do not vary with the time of day can recover an airport's relevant operating costs but do little to reduce peak-hour congestion. In many cases, efficient infrastructure pricing would require changes in the structure and the level of fees.

An increased reliance on user fees has two drawbacks. First, the efficient use of facilities may not be the only goal of an infrastructure program. To the extent that federal subsidies are intended to provide nonmonetary income transfers (as in the cases of federal support for water supply, mass transit, and aviation services to small towns), increased user fees clearly would be at odds with this purpose. Sometimes infrastructure programs are intended to spur regional economic development, and in such cases user fees would reduce the regional subsidy.