FEDERAL POLICIES FOR INFRASTRUCTURE MANAGEMENT

The Congress of the United States
Congressional Budget Office

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, DC 20402

NOTES

Unless otherwise designated, dollar amounts are in current values and dates are expressed in calendar years.

Numbers in text and tables may not add to totals because of rounding.

PREFACE

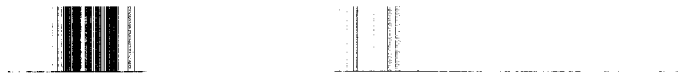
Are we investing enough in infrastructure? Are we choosing the right projects? These two questions lie at the heart of Congressional concerns about the condition of the nation's network of transportation and other basic facilities, as well as its adequacy to support economic and social activities. Current federal policies for infrastructure financing include matching shares and other conditions for capital grants, providing technical and operating standards for facilities, developing rules for appraising and comparing improvement options, and so on. This study, requested by the Economic Development Subcommittee of the House Committee on Public Works and Transportation, examines the ways in which these policies influence the choices made in federal, state, and local budgets of which projects to undertake and how much to spend.

The study was prepared in CBO's Natural Resources and Commerce Division. It was written by Jenifer Wishart under the supervision of Everett M. Ehrlich. David L. Bodde, David L. Lewis, Richard R. Mudge, and Mark Steitz made valuable comments at early stages of the project. Other helpful comments were provided by Robert W. Hartman, Roy Meyers, Kenneth I. Rubin, and Suzanne B. Schneider from CBO; Sante Esposito, Carl Lorenz, and Caroline D. Gabel of the Committee staff; and Damian J. Kulash of the Transportation Research Board. Matthew F. Hardison assisted in modeling revolving fund options discussed in Chapter VII. Johanna Zacharias edited the report. Gwen Coleman typed and prepared the manuscript for publication.

Rudolph G. Penner
Director

June 1986

CONTENTS



SUMMARY

Although infrastructure systems have evolved over the nation's first two centuries and have recently taken new directions, federal infrastructure management practices have not matured accordingly. Many federally aided public works programs fail to identify and evaluate in consistent terms the proper mix of new construction, rehabilitation, and operational improvements needed to provide the infrastructure base that a sound economy requires. These failures can lead to overinvestment in inefficient systems, disregard for national rather than local needs, inability to achieve the best use of facilities through pricing, and lack of appropriate and timely information for decisionmaking.

Federal policies play an important role in coordinating the development of the nation's infrastructure. Federal programs are important sources of infrastructure financing for states and local governments. In some cases--principally in national navigation systems--federal programs provide and operate facilities directly. In other instances, as in discretionary programs or demonstration projects, federal agencies approve planning for projects to be undertaken and operated by other governments. Thus, federal grant conditions--both for eligibility and amounts of aid--influence infrastructure development as clearly as do project choices in direct investment programs.

TOWARD A NATIONAL DECISIONMAKING PROCESS

The federal government's most important role in infrastructure provision is as a source of finance. State and local project managers actually select projects for 80 percent of infrastructure investments, but they provide only half the financing needed. Thus, for infrastructure to be managed in a way that furthers national objectives, federal agencies must offer incentives for local managers to align their choices with the welfare and equity goals of federal programs. Choices for infrastructure systems that aim at such broad objectives must similarly be based on wide searches among new investments, rehabilitation efforts, or operational changes. They must also be derived from consistent evaluations of the long-term effects of these possible choices on the efficiency of activities using the infrastructure.

Management systems for infrastructure must consequently be broadly designed to:

- o Identify what options are available,
- o Evaluate them correctly,
- o Implement the choices made.

Identifying Options

Federal programs show mixed results in encouraging sufficiently wide searches for projects that would improve the infrastructure. Too many programs actually discourage wide searches by offering states and localities only narrow ranges of projects eligible for aid. For example, despite growing federal assistance to mass transit, these systems have become increasingly irrelevant to the transportation choices of work-bound Americans. Between 1970 and 1980, the importance of public transportation for journeys to work dropped from 9 percent of all such trips to 6 percent. This drop mirrors the shrinkage in the transit network. Municipally owned bus systems now serve only half of all networks at 60 percent the service frequency of the private 1940s bus lines they replaced. But while mass transit services deteriorate and demand for them declines, transit subsidies are the fastest-growing item in infrastructure budgets. Direct support for capital investments has grown at an average rate (after price adjustments) of 14 percent a year since 1965. Further, nationwide additional investments in urban streets caused by the decline in transit use in the 1970s has been in the range of $3 billion a year.

The failure of federal assistance to promote efficient transit systems in the nation's cities stems from the biased perception that subsidizing transit services was necessary to preserve public transportation following the rapid growth of automobile use and the spread of urban areas during the 1950s and 1960s. Though federal assistance has concentrated on modernizing older transit systems serving travel to central cities, the development of frequent, convenient services between downtown and suburban destinations would have tended to maintain the attractiveness of transit services compared with the automobile.

On the other hand, federal programs that have encouraged broad choices among project types achieve gains in efficiency. Under state management and priority setting for wastewater plant construction assistance, for example, water treatments have evolved that are based on actual

water quality rather than on a set effluent-removal technology in attaining clean water goals. Thus, localities have been encouraged to use lower-cost systems for removing pollutants when these are as effective as the technologies approved by the Environmental Protection Agency for federal aid. Cities have recently been granted the freedom to switch federal aid from urban Interstate Highway System construction to other urban transport improvements. This freedom has sharpened their priorities for the selection of projects to complete the Interstate network. Overall, 71 percent of the Interstate highway gaps "traded in" under this program since 1980 would have been poor investments, with zero or even negative returns (losses) had they been constructed. Current federal provisions allowing communities to choose between capital investments and providing special services in promoting the mobility of disabled citizens have also promoted solutions better tailored to local circumstances.

Evaluating Projects

The techniques used to evaluate projects in federal infrastructure programs fall far short of the methods of life-cycle costing and discounting commonly used in the private sector to assess major commercial investments. Federally sponsored appraisals of projects commonly rely on single-year mid-life assessments of a project's effects, which disregard the unevenness of infrastructure investment and the different time profiles of project costs and benefits. Such studies distort views of the resource commitments needed to carry out projects. For example, rating procedures of the Urban Mass Transportation Administration have assessed as "cost-effective" transit projects that, in reality, would divert hundreds of millions of dollars in additional resources to providing in-city transport services. As a result of this approach to project appraisal, city managers have been obliged, within a short time of opening new transit systems, to raise new taxes to cover unexpected operating deficits.

Those federal agencies that do use life-cycle costing typically fail to account properly for the cost of capital. For example, when the current cost of capital is accurately taken into account, some 34 projects on the Corps of Engineers' suggested project list for 1986 provide cumulative benefits over a 30-year period that are less than the $4.4 billion needed to complete construction.

Failure to use analytic methods to guide programs' progress has contributed to the physical deterioration of the Interstate highway network. Highway program management that directed resources to improvements having the greatest effects on transport efficiency, for example, would

favor repairs on densely traveled corridors in poor or fair condition (the Interstates), and on only the worst segments of other systems. But the proportion of the Interstate urban highway network (the most heavily traveled of all Federal-Aid highways) in poor or very poor condition has doubled since 1975. In the same period, the extent of poor or very poor segments on rural Interstate highways (the next most densely traveled) has increased by 30 percent. Most of this reflects deterioration of highways that were in good or very good repair. Relatively lightly trafficked arterial and collector highways, on the other hand, have broadly improved their condition, with significant improvements of roads from good to very good rating. Highway status reporting, which relies on current-condition assessments and future needs estimates rather than on life-cycle costing, has not therefore been sufficient to identify program initiatives that further transportation goals.

Where consistent evaluation has in fact been used, management of federal infrastructure programs has improved. The inventory and screening procedures in the highway bridge program, for instance, encourage comprehensive consideration of options for operational changes (such as load posting or traffic management), rehabilitation, or replacement that reconcile structural or functional limits on bridges nationwide with the effects of these limits on traffic. The development of the National Airspace System plan, based on projections of changes in the configuration of air traffic control services and the costs of making them, offered a sound national investment in modernizing the system. As a result, these programs have promoted projects with high rates of return.

Incentives to Users and Program Managers

Federal programs fail to provide broad incentives to infrastructure users and local project managers to seek efficient choices. Where fees are charged, the prices of infrastructure services are often heavily subsidized, and users are generally not required to pay for the costs they impose on systems. This inflates and distorts patterns of demand. Congestion, caused by subsidized general aviation fliers, and road damage from undercharged heavy trucks, result in calls for capital expansion and improvements of the infrastructure that would not be required if all users paid their way. Trust funds, principally for highways and aviation but also recently established for transit and waterways, provide about 40 percent of federal capital assistance, and the earmarking of revenue sources has encouraged local managers to defer projects awaiting future trust fund appropriation rather than promptly undertaking construction or rehabilitation according to users' needs. Provisions of the Highway Trust Fund have encouraged tighter

expenditure controls than might have been instituted under federal general fund financing, but assured revenue sources from the trusts has encouraged independence in infrastructure agencies from state and local budget processes. This assured revenue also encouraged federal managers to add new programs without proper consideration of the continuing relevance of existing ones.

Moreover, at the state and local levels, studies in all infrastructure areas now fairly consistently find that 60 percent to 70 percent of federal aid fails to stimulate investment beyond the level that states and localities would have financed from their own resources. By and large, states and localities have become adept at converting categorical assistance into *de facto* block grants.

Further, state and local managers make use of municipal tax-free bonds to finance their projects. The federal subsidy conveyed through these instruments is tantamount to a "blank check", allowing local decisionmakers to deploy federal subsidies without regard to the project's conformity with national goals.

POLICY OPTIONS

The successes and lessons of program management that the Congressional Budget Office (CBO) has found suggest several opportunities to improve the effectiveness of federal infrastructure programs. These initiatives would complement ongoing efforts to improve information on budgets for capital spending (required under the Federal Capital Investment Information Act of 1984), and to provide annual reports on the condition and sufficiency of the infrastructure (required of the National Council on Public Works Improvements established by the Public Works Improvement Act of 1984). Two avenues of change appear particularly fruitful.

First, the Congress could require that, in supporting spending requests, federal agencies provide specific, budget-oriented information on the progress made toward each program's objectives, reviews of the efficacy of current practices in promoting infrastructure goals, and consistent information on the investment effects of diverse programs. These measures would change current reports to the Congress on infrastructure from reviews of current conditions and projections of future spending under different assumptions--status reports--to analyses demonstrating the outcomes of past spending and suggestions on management approaches to ultimate goals. The aim of such changes would be to draw agency executives most familiar with day-to-day management of programs more closely into monitoring them and

proposing beneficial changes in management practices. These types of changes would draw federal agencies into planning to achieve goals in the sectors they manage and into both program and project evaluations. The Congress would be presented with more realistic estimates of current and future spending under each program, and with documentation on the effectiveness of different policies.

Second, changes in the conditions for providing federal subsidies or in the channels through which disbursements are made could aim to improve state and local project choices. These changes would not necessarily alter aggregate national spending on infrastructure, but they would alter the relative federal and state/local responsibilities for providing financing. Lowering federal spending or encouraging federal managers to negotiate cost shares with project sponsors would make infrastructure managers more reliant on funds from state and local budgets, drawing them more closely into those selection procedures. Devising sunset conditions for programs would revise expectations about the permanence of federal assistance in programs that are nearing their goals. Calculating aid on the basis of total life-cycle costs rather than on those of capital investment costs alone might help to avoid biases favoring investments over operational improvements. With pricing policies that aim at efficient use of facilities, users could be drawn more closely into project choices. Another way to achieve better state and local project choices is to reduce the separate categories of aid so that projects compete more equally for financing; this might be accomplished either by using block grants or by parceling out ("tranching") aid into preferential categories that promote preferred management practices in infrastructure agencies.

States and localities might resist federal efforts to monitor programs more closely, and federal agencies might be unwilling to make objective reviews of programs and policies. Reduced federal support might prompt states to ignore the "spillover" effects that federal intervention seeks to correct. Greater shares of state and local funding might also fall more heavily on less-affluent groups because of the more regressive structure of nonfederal tax systems. Certainly, major changes in the management of infrastructure would require carefully recasting current federal, state, and local relationships in infrastructure programs. But redefining these roles would be an essential first step in bringing federal management of infrastructure programs into line with the current focus on ensuring access in each region to whatever mix of public facilities and services best serves that region's economic and social goals.

CHAPTER I

MANAGING THE NATION'S INFRASTRUCTURE

The condition of the nation's public infrastructure is a major public policy concern. This concern is reflected in a wide variety of proposals. These include changing the level of federal resources or the federal role in public infrastructure investments, making inventories of public assets or of "needs," and altering the manner in which the federal budget records public sector investments.

In this study, the Congressional Budget Office (CBO) addresses these issues by examining the system used to identify, evaluate, and implement those infrastructure projects that are financed by the federal government. The long-term objective of such a system is to arrive at a level of public spending and a mix of projects that will result in an infrastructure adequate to support the nation's social activity and economic strength.

The federal government currently owns and operates relatively little of the nation's infrastructure. Much of its influence on infrastructure development is therefore exercised through its budget support for different programs and through its regulations on standards and requirements for infrastructure systems of national importance. Consequently, an *infrastructure management system* will have its most important effect through the budgeting process and will try to improve the budget choices made among infrastructure projects. In the public sector, however, this budgeting process has a number of unique aspects that need to be kept in mind in developing an effective infrastructure management system.

BUDGETING IN THE PUBLIC SECTOR

An infrastructure management system must systematically determine the amount and composition of government budgets. Budgetary choices reflect goals and means. A budget reconciles the objectives of individuals and organizations with the resources they have. Households try to further their wellbeing, and firms seek profits. Governments, however, seek broader goals--national welfare or equity--that are less easily measured or compared. Nonetheless, they pursue such goals in choosing among proposals for financing. These choices involve costs. What level of resources should each activity use? Which activities must be forgone? Matching resources and

goals implies some consistent application of criteria, so that the mix of activities chosen consists of the best of the opportunities available.

The traditional model of budgeting in an organization begins by describing techniques for evaluating and ranking activities and projects in the order in which they can contribute to goals. The budget chosen then reflects whatever mix makes the greatest contribution that can be afforded. Any public sector infrastructure management system would be based on this model. But the system should also incorporate features that reflect the government's unique position.

First, governmental decisionmaking must be more comprehensive than that of families or firms. In pursuing any objective, households and corporations maximize their private returns or minimize their private costs. Governments, however, must consider costs and returns in a broader sense. A lower public cost is not always the same as a lower national cost. For example, lowering the cost of highways by reducing standards for the strength of highway pavement could lead to higher levels of road damage by heavy trucks, which in turn could raise costs for both motorists and state highway maintenance authorities by more than the amounts saved in construction costs. Similarly, national benefits are wider than any strict definition of government returns. In many infrastructure programs, returns to the government are found only in the broadening tax base of growing economic activity. But the cleaner air, swimmable water, safer navigation, or more efficient transport that result have clear national benefits. If infrastructure policy is to promote national goals for welfare and equity, then its effects on all sectors of society must be assessed and taken into account.

Second, the decisions must be consistent at both the program and project-selection levels. Federal managers are more often concerned with the size and scope of national programs (for example, Federal-Aid Highways) than with selecting individual projects. Federal decisions about the size of an overall program, its distribution among recipients, and the eligibility conditions for projects must provide state and local agencies the incentive to make project choices that reflect the program's goals, rather than strictly local preferences. Differences in outlook and responsiveness at different levels of government have to be factored into the process.

Third, in the public sector, the management system must be able to show the consequences of spending more or less than the proposed amount. The textbook model is usually one in which all budgetary choices are determined simultaneously. For administrative and practical reasons, however, budgetary processes frequently must choose first between similar