

Special Report 297

Funding Options for Freight Transportation Projects

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Committee for the Study of Funding Options for Freight Transportation Projects of National Significance

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This report has been reviewed by a group other than the authors according to the procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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Preface

This study of funding options for freight transportation projects was initiated by the Transportation Research Board (TRB) Executive Committee in 2006. The Executive Committee recognized that freight system bottlenecks are a potentially significant hindrance to economic growth. It recognized also the concerns in government and industry that established institutional and finance arrangements have not adequately responded in recent decades to the demands imposed by growing volumes of freight and passenger traffic and fundamental shifts in regional and global patterns of trade.

To conduct the study, TRB formed a committee that included members with expertise in infrastructure management, freight transportation management, business logistics, public-sector finance, economics, and public policy. The committee's task was to consider how reforms in the public-sector finance arrangements supporting transportation facilities could improve the efficiency of freight transportation in the United States. The study was sponsored by TRB and by the UPS Foundation, Inc.

The committee received briefings at its meetings from government and private-sector transportation administrators and from experts in various aspects of public finance. The committee reviewed the institutional and finance arrangements of a number of recent significant projects to gain an understanding of the funding options available today and the challenges that these projects confront. It was aided in this review by Gary Maring and Iris Ortiz of Cambridge Systematics and Daniel Smith of the Tioga Group, Inc., who prepared detailed case studies of projects. The committee made use of the work of earlier TRB committees that studied related problems, especially those that authored the reports *Policy Options for Intermodal Freight Transportation* (Special Report 252, 1998); *Freight Capacity for the 21st Century* (Special Report 271, 2003); *The Marine Transportation System and the Federal Role: Measuring Performance, Targeting Improvement* (Special Report 279, 2004); and *The Fuel Tax and Alternatives for Transportation Funding* (Special Report 285, 2006).

The report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the National Research Council's (NRC's) Report Review Committee. The purpose of this independent review is to provide candid and critical comments that assist the authors and NRC in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The content of the review comments and draft manuscript remain confidential to protect the integrity of the deliberative process. The following individuals participated in the review of this report: Cameron Gordon, University of Canberra, Australia; Larry M. King, Naples, Florida; Ian W. H. Parry, Resources for the Future, Washington, D.C.; Eugene K. Pentimonti, Great Falls, Virginia; Tracy L. Rosser, Wal-Mart Stores, Inc., Mandeville, Louisiana; John M. Samuels, Jr., Palm Beach Gardens, Florida; Kumares C. Sinha, Purdue University, West Lafayette, Indiana; and William G. Waters II, University of British Columbia, Vancouver.

Although the reviewers listed above provided many constructive comments and suggestions, they were not asked to endorse the committee's conclusions or recommendations, nor did they see the final draft of the report before its release. The review of this report was overseen by Lester A. Hoel, University of Virginia, and C. Michael Walton, University of Texas,

Austin. Appointed by NRC, they were responsible for making certain that an independent examination of the report was carried out in accordance with institutional procedures and that all review comments were carefully considered. Responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Joseph R. Morris managed the study and drafted the final report under the guidance of the committee and the supervision of Stephen R. Godwin, Director, Studies and Special Programs. Suzanne Schneider, Associate Executive Director of TRB, managed the report review process. Norman Solomon, Senior Editor, edited the report, and Jennifer J. Weeks, Editorial Services Specialist, prepared the prepublication manuscript and background papers for web posting, all under the supervision of Javy Awan, Director of Publications. Nikisha Turman and Laura Toth assisted with meeting arrangements and communications with committee members.

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Summary

During the 1990s, capacity constraints became evident in parts of the U.S. freight transportation system, the consequence of economic and population growth and changing patterns of domestic and global commerce. The constraints impaired economic productivity, but resolving them taxed the institutional and financial capacities of public- and private-sector transportation providers. The most visible problems were congestion at certain important nodes of the system, for example, at the largest seaports and at terminal operations at inland hubs like Chicago, and their surrounding areas.

Improving freight flow at congested locations usually is a complex undertaking, requiring cooperative action by state and local government jurisdictions, federal agencies, and private-sector firms. Typically, the required projects are intended to produce a mix of benefits to private firms (lower costs to freight carriers who use the infrastructure and to shippers who own the freight) and to local residents and noncommercial travelers (e.g., reduced congestion from elimination of conflicts between passenger and freight traffic). They usually involve coordinated packages of capital and operational improvements at publicly owned (e.g., port and highway) and private (e.g., railroad and terminal) facilities.

The charge to the Transportation Research Board's Committee for the Study of Funding Options for Freight Transportation Projects of National Significance asked the committee, first, to analyze the rationale for public investment in freight infrastructure and, as a related question, to assess the relevance of the concept of national significance as a possible criterion for determining federal government responsibility. Second, the committee was to evaluate alternative finance arrangements for freight infrastructure.

The recession that began in December 2007 sharply reduced traffic and congestion and altered the outlook for traffic growth. These events have not reduced the relevance of transportation finance reform. Congested conditions will return with recovery, as after past recessions. More significantly, finance reform will be an opportunity to improve the performance of the transportation system. Changes in finance arrangements can yield economic benefits by improving investment decision making and the operating efficiency of freight infrastructure, regardless of the level of traffic over the next decade.

The first two sections below are summaries of the committee's findings concerning government responsibilities for freight infrastructure and the adequacy of existing finance arrangements. The final section is a summary of the committee's recommendations for changes in finance arrangements.

GOVERNMENT RESPONSIBILITIES FOR FREIGHT INFRASTRUCTURE

To analyze the rationale for public investment in freight transportation projects, the committee considered three questions: First, in what circumstances is public-sector involvement in the freight transportation system needed? Second, when is federal government involvement warranted? Third, when does the public-sector responsibility require building or paying for infrastructure, as opposed to any other form of intervention, for example, regulation?

Need for Government Involvement

- In practice, government roles are dictated primarily by established responsibilities that are not likely to change fundamentally in the near term. Governments provide and operate most freight infrastructure, impose fees and taxes to support these facilities, provide research and information, and impose environmental and economic regulations.
- Expansion of government involvement should be limited to certain defined circumstances in which market-dictated outcomes would be far from economically efficient. These include restraining exercise of monopoly power and dealing with nonmarket costs of pollution, congestion, and accidents. Proposed alterations in established government responsibilities should be evaluated carefully and the risks weighed against the possible benefits.
- Government involvement and leadership are practical necessities in complex projects: large projects that extend through multiple jurisdictions, involve sensitive environmental issues, and involve coordinated improvements to publicly and privately owned facilities serving passengers and freight.

Need for Federal Involvement

- The federal government has important opportunities for contributing to freight system performance and infrastructure development by improving execution of its established functions: the federal-aid programs for highways and airports, the systems directly provided by the federal government (air traffic control, inland waterways, and marine harbor channels), essential federal functions such as customs and border security, and environmental and economic regulations.
- There is a federal responsibility to intervene in exceptional circumstances where state and local governments and the private sector lack the capability to carry out an economically beneficial project without assistance. Such circumstances may include projects imposing high external costs on local communities that state and local governments lack authority to control, and unusual projects with high potential return but also high risk and for which conventional methods of raising capital are not feasible.
- The federal government needs more effective instruments, including reforms in financial aid programs, to carry out these responsibilities.
- National significance, as the term has been used in federal laws and in transportation policy debates, is not a definitive criterion for deciding which transportation projects merit extraordinary federal support or involvement. Any substantial freight transportation infrastructure project that is expected to yield benefits is significant to the national economy. Instead, the federal role should be defined more restrictively: a project merits federal assistance if it is of high economic value and would not be accomplished by the state and local governments and the private sector acting alone.

Forms of Government Intervention

- Once the determination is made that government involvement (at the federal, state, or local level) is required, it is necessary to search for the most cost-effective action, considering public investment as well as other forms of intervention. Building or paying for infrastructure seldom is the only option for fulfilling the government responsibility. Regulation, taxation, pricing, and closer public-private cooperation can mitigate problems of pollution and congestion

without shifting cost burdens for commercial facilities to the public. For example, government could reduce freight market distortions that affect competition among the rail, truck, and water modes by charging users of public freight facilities (highways and waterways) fees that more closely correspond to the cost of providing service to each user.

- The objectives of freight projects often include reducing adverse community impacts of traffic. In practice, public–private cost sharing in such projects as rail–highway grade crossing separations (a typical mitigation project) is determined by negotiation among the parties. Wherever shippers and carriers can be induced or required to pay for impact mitigation, this outcome will not be detrimental to efficient freight system development provided the cost is justified by the benefit to the community. In cases where legal, equitable, or practical considerations prevent government from imposing the cost burden on shippers or carriers, it may be in the public interest for the government to pay for mitigation. This will be consistent with economic efficiency provided the government seeks cost-effective mitigation options. If the federal government pays a share of costs, it becomes responsible for assessment of the costs and benefits of the alternatives.

EVALUATING FINANCE ALTERNATIVES

The committee reviewed the finance arrangements (i.e., the sources of funds for building and operating facilities, policies with regard to pricing and fees, mechanisms for raising capital, and investment decision-making processes) in prominent projects and the forms of government involvement in project development and finance to determine whether existing arrangements are adequately serving the needs of industry and the public. The criterion for judging the arrangements was the impact on the performance of the freight transportation system. Satisfactory finance arrangements should promote efficient investment and operation. That is, they should encourage investments that yield economic benefits and discourage poor investments, and they should encourage operating practices on existing facilities such that service is provided to those who value it more highly than the cost of producing it and is not provided to others. The cost of transportation services includes congestion, environmental costs, and accident costs. The three findings were as follows.

1. Present finance arrangements are inadequate for maintaining and improving freight transportation system performance.

The future reliability of present major sources of public funding is uncertain. Of equal importance, public-sector finance arrangements often are not designed to provide incentives for efficient development and operation of transportation facilities. The problems that today appear to hinder efficient operation and optimum investment are listed below. All but the last are related to finance arrangements and could be ameliorated by reforms to finance arrangements.

- Operating practices of public infrastructure providers fail to optimize performance. Users must tolerate congestion that could be avoided by demand management through pricing or other methods.

- Investment decision making lowers the average return on investment. Capital spending often is directed according to distributional considerations rather than targeted to investments that would yield the greatest public benefits.
- Public policies add to costs and discourage investment. The added costs include avoidable regulatory delays and subsidies that distort competition.
- The institutional capacity and authority to undertake unique and complex projects at major ports and transportation hubs are lacking, particularly when participation of multiple government jurisdictions is required.
- Problems arise from external, social, and economic trends: rapid change in patterns of freight demand complicates planning; increasing population density and wealth drive up the costs of infrastructure expansion; and security requirements, especially at ports and land border crossings, impose new costs and administrative bottlenecks.

2. Finance reforms should be designed to promote productivity gains.

Finance arrangements are among the most powerful instruments available for improving the performance of the freight transportation system. Choices concerning funding sources and fees charged to users strongly influence investment decisions and the utilization of facilities.

3. Finance reform options differ in their probable impacts on freight system performance.

The committee reviewed proposals for new finance arrangements that have been prominent in discussions of transportation infrastructure policy. The various proposals differ primarily in four characteristics: the division between public and private responsibility for providing funds and for investment decisions, the division of responsibility between the federal and state governments, the kinds of fees charged to users of facilities and the dependence of project funding on fee revenue, and the extent of subsidies that allow shippers to pay less than the cost of service. Each of these characteristics influences public and private investment decisions and the decisions of system users about their transportation and logistics practices. Reforms must be selected with these performance consequences in mind.

Revenue adequacy is a primary concern in designing finance arrangements. The most prominent revenue proposals include increasing the rates of the taxes that now pay for infrastructure, creating a new national or regional freight user fee, and funding more of transportation capital spending out of general government revenue. A fourth option, developing new facility-specific user fees that reflect the cost of providing service to the users of a facility (for example, highway tolls and charges to port users to pay for access infrastructure) would be the revenue source most consistent with the goal of improving system performance in most circumstances, although creating new facility-specific fees will be challenging. Fee structures must be tailored to the special characteristics of each project and institutions (for example, special-purpose authorities) created with powers to impose and collect fees and dispense the revenues.

RECOMMENDATIONS

1. Guidelines for Federal Assistance to Freight Infrastructure Development

Federal programs to assist in the development of freight infrastructure should adhere to the guidelines listed below. They are intended to apply to federal involvement in projects that fall outside the bounds of the established finance arrangements for federal-aid highways and facilities directly provided by the federal government (inland waterways, harbor channels, and air traffic control). However, the underlying principles are sound for any public transportation infrastructure investment.

The federal role in financial assistance should be facilitative and incremental.

Federal assistance should be employed as a pragmatic means to stimulate action by state and local governments or by the private sector on difficult problems where the potential economic benefit from improved freight mobility or the potential reduction in external costs is great. In keeping with this objective, the dollar value of any special federal assistance to nonhighway projects and multimodal projects normally should not exceed a small share of total project costs.

Federal assistance programs should promote development and use of well-designed facility charges and other local and facility-specific revenue sources.

Federal policy should encourage and provide incentives for development of local and facility-specific revenue sources to pay for construction and operation of freight facilities. Federal law should not impede imposition of user charges, and federal programs should not offer inducements to local authorities to substitute grants for funds that could be raised through user charges or other local sources.

Federal assistance programs should be flexible and adaptable to diverse infrastructure projects.

Any federal freight infrastructure assistance program should be structured to address projects on a case-by-case basis, and it should be flexible enough to address diverse assistance needs. Federal assistance should use a variety of forms of aid, including grants, loans, and other kinds of credit assistance.

Legislation establishing federal assistance programs should direct the administration of the programs by defining project evaluation criteria rather than by identifying projects to receive aid.

Project earmarking in federal transportation assistance programs that circumvents executive agency evaluation weakens the effectiveness of those programs.

Federal policy to promote efficient freight infrastructure development should encompass reforms in regulatory, management, and tax policies that affect freight infrastructure performance.

The scope of federal laws and programs that affect freight system performance and infrastructure development is broad. It includes grant programs; direct federal provision and operation of facilities; environmental, safety, and economic regulation; border security; and impositions of special user taxes and general taxes that influence investment. A comprehensive federal policy to promote efficient development of freight infrastructure must coordinate actions in all of these areas of federal involvement to achieve the common objective of improved system performance.

2. Federal Discretionary Assistance Program Reserved for Freight Projects

Congress should create a new discretionary assistance program to support freight infrastructure projects. The objective should be to bring federal resources to bear to ensure completion of freight projects that would yield large national economic benefits or large reductions in external costs and that other government and private-sector parties could not complete without federal involvement, or could not complete in a timely and cost-effective manner. The program should be established initially as a test of the need for and value of a responsive and flexible federal program of assistance to freight projects.

The main features of the program should be as follows:

- *Limited initial scale:* The program should be funded by a multiyear congressional authorization, on the order of the magnitude of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) Section 1301 Projects of National and Regional Significance program (\$1.8 billion over 5 years). Funding preferably would not be taken from revenue now dedicated to other transportation purposes, but to avoid complications during the trial, initial funding from existing user taxes or general revenue funding would be acceptable.
- *Assistance awarded competitively:* Project selection should be based on explicit policy objectives and evaluation criteria. At least during the trial period, assistance should be awarded at the discretion of the Secretary of Transportation.
- *Limited initial duration and sunset:* The program should be enacted explicitly as a trial for a fixed term of 4 to 6 years with a requirement for independent evaluation at the end of the period to determine whether a larger, longer-term program is warranted. If evaluation shows that the program is worthwhile and it is renewed, the continuing program should be funded by a revenue source derived from freight system users, and the most appropriate form for its permanent organization should be considered. An alternative form would be to create a government-owned corporation authorized to award assistance.
- *Assistance in the form of grants and credit assistance:* Aid normally should be in the form of credit assistance. Grants (always for a minority of expenditures) should be considered only in instances where a loan would not suffice to allow a project to proceed and only for certain purposes, which would include preconstruction development assistance, incentives for projects that demonstrate innovative finance arrangements and administrative structures, incentives for multistate projects, and a means for the federal government to exert leverage in promoting projects that are of particularly high economic value yet face especially difficult local obstacles.

- *Limited federal participation:* The value of federal loans and grants should be a small share of total project cost.
- *Focus on capacity enhancement or environmental mitigation:* The program should be devoted to projects to construct freight capacity or mitigate harmful external impacts of freight traffic, or for equipment and start-up costs associated with operational improvements.
- *Preference for projects with user charges:* A project's ability to generate revenue from its users is evidence of economic benefit to users and helps ensure that it will be sustainable in operation.
- *Economic justification:* Standardized requirements should be defined for demonstrating economic justification of the project in applications for aid through the program. Applicants would present their own evaluation, to be reviewed by the U.S. Department of Transportation (USDOT).
- *Justification for federal involvement:* Applicants should be required to show that federal involvement would speed project completion, lower costs, or otherwise increase the likelihood of success.
- *Outcome evaluation:* Applicants should be required to present an analysis plan and commit to conducting an outcome evaluation of the completed project that compares actual cost and usage with projections. USDOT would report to Congress periodically on the results.
- *Integration with other assistance programs:* Administration of the program should be integrated with administration of freight project assistance that is delivered through the Transportation Infrastructure Finance and Innovation Act (TIFIA), Railroad Rehabilitation and Improvement Financing, and SAFETEA-LU private activity bond programs. That is, freight projects should gain consideration for all available forms of federal assistance through a single application and review process.

3. Federal Credit Assistance and Tax Incentives for Freight Infrastructure Projects

The federal government should make credit assistance more accessible and attractive to freight projects that merit federal support. Also, Congress should reduce the bias in tax law that now favors public over private development of highways and other infrastructure historically provided by public agencies.

Direct Federal Loans and Loan Guarantees

Changes should be enacted in the TIFIA program to create a federal loan program that is more accessible to sponsors of freight projects and that gives USDOT increased flexibility in adapting the assistance offered to the characteristics of individual projects. Chapter 6 identifies specific changes for this purpose.

Tax-Exempt Bond Finance

To encourage private-sector participation in provision of freight infrastructure, the tax laws should be neutral with respect to private versus public management and finance of the kinds of facilities that commonly are built by the public sector. Neutralizing this bias fully would require adjusting or eliminating the caps in federal law on the volume of private activity bonds that may be issued for highways and other specific categories of projects.

Infrastructure Banks

Another possible source of government assistance would be an infrastructure bank: a revolving fund, capitalized, at least in part, by the government. If new federally sponsored infrastructure banks are created, their operation should be consistent with the principles for federal assistance listed in Recommendation 1 above. Preference should be given to projects that generate revenue for loan repayment, and requirements should be imposed for efficient operation and pricing.

4. Federal Actions to Promote New Local and Project-Specific Revenue Sources

The federal government should reduce barriers to the development of local and facility-specific revenue sources to pay for construction of freight transportation facilities and should provide incentives to encourage use of these revenue sources.

Remove barriers to user charges and establish federal policy in support of such charges.

Congress should reduce impediments to imposition by port authorities of charges on cargoes passing through their ports by establishing in law a federal policy in support of such charges for the purpose of providing revenue for construction and operation of port facilities and access routes. In addition, provisions in the federal-aid highway program that restrict imposition of tolls on highways built with federal-aid funds should be removed, although federal responsibilities (for example, to ensure that interstate commerce is not interfered with) may necessitate some form of oversight.

Promote user charges with incentives.

Federal assistance to freight infrastructure projects should include incentives to encourage transportation facility operators to undertake user-charge funding and to establish organizational arrangements for setting charges and providing facilities.

Remove barriers to international investment.

Congress should act to reduce legal barriers to foreign ownership, operation, and investment in the U.S. transportation industry, particularly in the maritime and aviation industries, to the extent consistent with national security.

Provide information, planning, and training assistance.

The federal government can promote use of local and project-specific revenue sources through information dissemination, planning assistance, and training. USDOT should serve as an information clearinghouse and technical assistance resource, as proposed in Recommendation 5 below.

5. Freight System Monitoring, Planning, and Project Evaluation

The federal government should expand its capabilities for freight system planning and project evaluation and for data collection in support of freight system performance monitoring.

Organizational Structure

USDOT should designate or create a discrete, identifiable institutional home for the functions of project evaluation, performance monitoring, and technical assistance to state and local governments. The organization should also have cooperative relationships with state and local governments and with the freight industry. It should provide products that are useful to state and local governments, including evaluation and planning techniques that define best practices.

Freight System Monitoring

The federal government should expand its existing freight system monitoring program by developing a continuing, comprehensive, and systematic program to monitor the performance of the national freight transportation system and to identify sources of inefficiency. Monitoring should measure performance in physical and in economic terms.

Freight System Planning

The federal government should develop improved capabilities for short-term forecasting and for short- and long-term scenario analysis of freight transportation markets and freight transportation system performance. Planning should use methods that incorporate consideration of risk and uncertainty.

Project Evaluation

The federal government should undertake a program of research, demonstrations, and outreach activities to develop and promote the use of sound project evaluation in public freight infrastructure programs. The federal government should work with state and local government agencies through this program to develop the agencies' technical capacity in project evaluation.

Introduction

During the 1990s, capacity constraints became evident in parts of the U.S. freight transportation system, the consequence of economic and population growth and changing patterns of domestic and global commerce. The constraints threaten to impair economic productivity, but resolving them has taxed the institutional and financial capacities of public- and private-sector transportation providers. The most visible problems have been congestion at certain important nodes of the system, for example, at the largest seaports and at terminal operations at inland hubs like Chicago, and their surrounding areas. These problems have raised awareness of the importance of efficient freight transportation, and freight problems are now prominent in discussions of transportation policy.

The recession that began in December 2007 sharply reduced traffic and congestion and has necessitated revisions in projected future traffic levels. These economic circumstances do not reduce the relevance of transportation finance reform. Congested conditions will return with recovery, as they have after past recessions. More significantly, finance reform will be an opportunity to improve the performance of the transportation system. Changes in finance arrangements can yield economic benefits by improving investment decision making and the operating efficiency of freight infrastructure, regardless of the level of traffic over the next decade.

Improving freight flow at congested locations usually is a complex undertaking, requiring cooperative action by multiple state and local government jurisdictions, federal agencies, and private-sector firms that normally are competitors. Typically, the required projects are intended to produce a mix of benefits to private firms (lower costs to freight carriers who use the infrastructure and to shippers who own the freight) and to local residents and noncommercial travelers (e.g., reduced congestion from elimination of conflicts between passenger and freight traffic). They usually involve coordinated packages of capital and operational improvements at publicly owned (e.g., port and highway) and private (e.g., railroad and terminal) facilities.

The fundamental obstacles these projects confront are as much institutional as financial in nature. They arise from fragmentation of jurisdictions and responsibilities, legal and regulatory constraints, and historical management practices that failed to promote efficient facility use and investment decisions. Nonetheless, negotiations among the parties seeking solutions to freight bottleneck problems tend to hinge on finance questions: how costs should be shared among the parties, how required funds should be raised, and who should bear the risk that expected benefits or revenues do not materialize. Decisions on these finance questions shape the institutional structure of the project: the roles of the public- and private-sector parties in planning, governance, and management of the facility.

Freight infrastructure in the United States is provided by both the government and the private sector. Government accounts for the larger share of infrastructure spending and provides highways, the inland waterways, and most aviation and seaport facilities. Freight railroads and pipelines are privately provided. Most government-provided transportation infrastructure (including most spending for highways and aviation and a share of water transport spending) is paid for through long-established arrangements under which revenue from fees and taxes imposed on users of the facilities is pooled in special funds, sequestered from general funds, and

dedicated to transportation uses. These arrangements have been regarded as successful historically in reinforcing the effectiveness of the transportation programs they supported (TRB 2006, 185); however, the stresses on freight transportation system capacity have caused some industry participants to conclude that the existing arrangements alone are no longer adequate. The most common criticism is that finance arrangements (see Box 1-1) are failing to generate revenue sufficient to support construction of high-payoff projects, but these arrangements may also be contributing to freight system problems if they fail to direct funds to the most valuable projects, fail to provide incentives for efficient operation of facilities, or discourage private-sector provision of infrastructure.

The Transportation Research Board (TRB) formed the Committee for the Study of Funding Options for Freight Transportation Projects of National Significance to evaluate finance strategies and to identify the appropriate roles for government in selecting investments and in paying for freight infrastructure projects. The following section presents the study charge to the committee. The next introduces current freight infrastructure finance arrangements. The third summarizes conclusions of four previous TRB committees that considered some of the transportation finance policy questions that are the topic of this study. The final section outlines the remainder of the report.

CHARGE TO THE COMMITTEE

The committee's charge (defined in the study task statement approved by the National Research Council) is as follows:

This study will analyze the rationale for public investment and evaluate financing strategies for freight transportation projects of national significance. Criteria will be developed for defining "national significance," and the committee will assess the ability to use such criteria to select projects. Generic financing options will be evaluated and compared based upon the greatest net benefit and least cost per public dollar invested.

The study charge reflects a recurring debate over national freight transportation policy as it has been implemented in the federal surface transportation aid program [reauthorized most recently in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) of 2005, which expires in 2009]. The 1991 reauthorization, the Intermodal Surface Transportation Efficiency Act (ISTEA), introduced new provisions to promote freight planning and to allow states and local governments some flexibility in using federal surface transportation aid for nonhighway or mixed-mode freight projects. The explicitly freight-related provisions of the federal-aid program have been modified and extended over the past 16 years but have had only modest impact on public capital spending priorities. Freight industry advocates have urged Congress to take stronger action to define a national policy to promote efficient investment and freight system operation (e.g., Kavinoky 2007, 6; AASHTO 2007, 37–39).

BOX 1-1

Definitions: Assistance, Finance, Finance Arrangements, Financing, Funding, Government, Project

Assistance: In this report, *assistance* refers to a grant, tax incentive, loan, or loan guarantee offered by a governmental entity to private firms or individuals or to other governments (e.g., by the federal government to the states).

Finance: As a noun, *finance* is meant in the sense that it is used in the term *public finance*, a field of economics defined as follows in one text: “Public Finance is concerned with the income and expenditure of public authorities and with the adjustment of the one to the other” (Dalton 1922, quoted by Prest and Barr 1979, 3). Public finance as a field of economics seeks to understand how changes in the forms of government revenues and expenditures affect the welfare of individuals (Prest and Barr 1979, 2).

Finance arrangements: In this report, in the case of transportation projects involving the public sector, *finance arrangements* refers comprehensively to the sources of the funds expended on building and operating the facilities (which may include user fees in various forms and contributions from general tax revenue or from other forms of taxes and may entail raising funds through borrowing) and the processes by which spending decisions are made concerning project selection and operating budgets, including the relationship between revenue and spending decisions.

Financing: In this report, *financing* (or, as a verb, *to finance*) refers to the activity of raising a pool of funds to make a capital expenditure, which in practice often involves borrowing (e.g., through issuance of any of various forms of bonds sold to investors) and may involve public equity contributions (i.e., grants) and equity contributions by private partners in a public–private enterprise.

Funding: Providing or identifying a source of resources to support a project or program. For example, Congress funded the federal-aid highway program by dedicating the revenue of the federal highway user taxes to transportation purposes.

Government: References to *government*, unless otherwise qualified, refer to all levels of government in the United States: federal, state, and local, including special-purpose public authorities (e.g., airport, seaport, and turnpike authorities). “Public sector” is used synonymously.

Project: The committee has assumed that *projects* in the charge refers to capital projects; that is, expenditures to acquire assets that are to provide services over a period of years. In most projects, the asset will be physical infrastructure (including communication and information technology facilities). In some projects, the initial expenditure, rather than for infrastructure, is primarily to develop and implement an organizational or operational change intended to yield benefits over time.

Understanding the origin of the charge requires knowledge of past use of the term “projects of national significance.” The TRB report *Policy Options for Intermodal Freight Transportation* traced the history of the term in discussions of federal freight infrastructure policy (TRB 1998, 47–61). An early use was in the 1994 report of the National Commission on Intermodal Transportation (created by Congress in ISTEA), which concluded that “the national intermodal transportation system should ensure funding of projects of national or regional significance. . . . Congress should provide special funding annually to support some number of intermodal projects that are truly of national or regional importance.”

At the time of the commission’s report, freight interests, and particularly the ports, which were experiencing unprecedented growth, were frustrated that ISTEA had not increased funds for their high-priority projects. A 1996 report concluded that less than 1 percent of ISTEA funds had gone to projects that could be identified as intermodal freight (GAO 1996). In the view of freight advocates, the principal obstacles were that, with few exceptions, aid provided in the federal surface transportation program can be used only for highway projects, not for infrastructure for rail or other modes, and that the state transportation departments and metropolitan planning organizations that control federal-aid project programming do not give freight-related projects like port access the priority the freight interests believe they deserve.

The failure of ISTEA to yield much additional federal help for specifically freight-related projects renewed proposals for direct federal intervention of three kinds: federal rules that would induce the states to give priority to freight-related projects, for example, reserving a portion of federal-aid funds for such purposes; authorization for federal aid to be spent on freight rail infrastructure; and creation of new revenue sources in the form of taxes imposed on freight system users and dedicated to freight-related purposes. Such proposals were debated before each of the two subsequent reauthorizations of the federal surface transportation program [the Transportation Equity Act for the 21st Century (TEA-21) of 1998 and SAFETEA-LU] but have not been enacted. Legislation in the 1990s did provide for federal credit assistance to freight projects.

“Project of national significance” and similar terms were used in policy statements of the U.S. Department of Transportation (USDOT) and of freight interest groups and in federal legislation during the 1990s to designate the category of projects meriting federal support. Most recently, SAFETEA-LU (Section 1301) created a new federal-aid program category, Projects of National and Regional Significance, which was to award funds competitively to freight and passenger projects proposed by the states. (Congress earmarked the entire authorized amount to be spent on specified projects, so no competitive awards were made.) The legislation did not contain a restrictive definition of “project of national and regional significance.”

In all these past uses, the concept of project of national significance was meant to encapsulate the argument that because facilities like ports serve freight bound for every part of the nation and affect the economy of every state, they are properly a federal responsibility, and the federal government should directly ensure that they receive adequate investment. For example, the “Findings” paragraph of SAFETEA-LU, Section 1301, states the following: “A program dedicated to constructing projects of national and regional significance is necessary to improve the safe, secure, and efficient movement of people and goods throughout the United States and improve the health and welfare of the national economy.” The term has been used solely as a criterion for determining eligibility for federal assistance.

Because of this history of use of the term, the committee understands the questions in the study charge concerning projects of national significance to direct it to determine the

responsibility of the federal government in promoting the development of freight infrastructure and in participating in finance arrangements for freight infrastructure projects.

Port advocates, including the port authorities and state and local governments who see their ports as economic development engines, have been prominent in the debates over federal involvement in freight infrastructure finance, but at the same time interest in multimodal freight projects has grown among other states and cities. Some states, in planning to accommodate future traffic on their busiest Interstate routes, have examined the option of investing in rail as well as highway capacity, seeking to reduce their costs and improve highway performance by shifting some of the expected traffic growth from highways to rail. States also have aided railroads in clearing obstructions to operation of double-stack container trains on the railroads' mainline routes, and Chicago and other hub cities are seeking solutions to their freight-related congestion problems. States can receive only limited federal assistance for these kinds of projects under existing federal program rules.

The committee's charge is not limited to transportation activities directly affected by the federal surface transportation acts (which cover highways and some intermodal activities). Air freight and ports are affected by federal aviation and water resources programs, and federal tax law and trade regulations affect transportation finance activities.

The charge also is not limited to questions about federal policy. The states have been the leaders in developing public-private freight projects and in working out finance arrangements. The committee has considered the proper balance of federal, state, and local government responsibilities with regard to these activities, as well as the rationale for public involvement at any level of government.

The private sector undertakes nearly all infrastructure investment in railroads and provides facilities at ports, airports, and intermodal terminals. Government actions that affect private-sector investment decisions are within the scope of the committee's charge to evaluate finance options. Such actions may include taxes, regulations, and subsidies, as well as actions to involve the private sector in functions that are now carried out by government (for example, private operation of roads).

Recent policy discussions concerning freight finance in the United States have tended to concentrate on arrangements for nonhighway facilities, especially railroads; for port facilities and highway and rail access routes to ports; and for intermodal terminals at ports and inland. These facilities have been the focus because highways already have well-established finance arrangements with dedicated revenue sources and defined federal and state roles, and because port interests have been prominent in political efforts to gain more support for freight-related projects. Nonetheless, as Chapters 2 and 3 will show, most freight transportation infrastructure spending is for highways, and most shipper expenditures for freight transportation are for trucking services. The committee's findings and recommendations in Chapter 6 concern primarily public involvement in finance arrangements for nonhighway facilities. However, the principles underlying the recommendations would be applicable to highway finance, if at some time the highway finance system undergoes comprehensive reform. The TRB committee that authored *The Fuel Tax and Alternatives for Transportation Funding* (TRB 2006) identified possible directions for such reform.

The study charge stipulates that "financing options will be evaluated and compared based upon the greatest net benefit and least cost per public dollar expended." Criteria appropriate for evaluating alternative finance arrangements were identified by the TRB committee that authored *The Fuel Tax* (TRB 2006, 18-19):

Finance arrangements are central to the performance of the transportation system. Choices about fees and taxes charged to users and about funding sources are critical not only to the feasibility of a transportation project or program but also to the likelihood of its success. The finance system is a major influence on decisions about which projects and services are provided and how existing facilities are utilized. Therefore, any fundamental change in finance arrangements (e.g., replacing current user fees with fees of a different form) would strongly affect transportation system performance. Decisions on finance also determine the distribution of the costs and benefits of transportation programs. Finance alternatives should be evaluated in terms of these impacts.

The committee understands the criteria stated in its study charge and in *The Fuel Tax* report to be consistent. In assessing alternative finance arrangements, the committee has applied *The Fuel Tax* study's criterion of impact on the performance of the transportation system, taking into account not only revenue adequacy but also the effect of finance arrangements on investment decisions and the behavior of users. The committee sought finance arrangements that promote efficient investment and operation. Finance arrangements will promote efficiency if they incorporate incentives favoring investments that yield benefits exceeding their costs and discouraging investments that do not, and incentives that favor operating practices on existing facilities that discourage uses that have less value than the cost of providing service (TRB 2006, 19). The cost of transportation services includes congestion, environmental costs, and accident costs.

In summary, the committee interpreted the study charge as a series of questions concerning government's role in providing freight transportation infrastructure and the best way to pay for infrastructure: how to determine the projects that require public-sector investment, how to define the scope of the federal government's responsibility, and what finance arrangements would result in the best performance of the freight system from the point of view of the public.

EXAMPLES OF FINANCE ARRANGEMENTS

The study charge refers to financing strategies and financing options for freight transportation projects. To indicate the diversity of such projects and of the finance arrangements supporting them, this section describes two government programs that provide funds to pay for freight transportation infrastructure construction and three large freight-related projects that have received public support. The examples below also serve to introduce some of the policy questions implied in the study charge, as described at the end of the section. Chapter 3 presents a more comprehensive description of finance arrangements for government-provided infrastructure and case studies of a variety of projects.

As an indication of the scale of these activities, recent annual capital expenditures for some components of freight transportation infrastructure are as follows (FHWA 2007, Table HF-10; AAR 2007, 44; BEA 2006, Table 3.7S; MARAD 2007, Table 2; Institute for Water Resources 2004; BTS 2006, Table C-7; CBO 2008; American Short Line and Regional Railroad Association 2007, 12):

	<i>Expenditures (\$ billions)</i>
Highways (2005)	75.2
Railroad (Class I and short line) structures (2005)	5.8
Seaports (government) (2005)	2.0
Inland waterways (2002)	0.3
Trucking industry, structures (2005)	0.5
Aviation (government and private)(2004)	14.4

Highways and aviation facilities (as well as rail and water facilities, to a much lesser extent) serve passengers in addition to freight. The Federal Highway Administration's (FHWA's) highway cost allocation studies assign heavy trucks the responsibility for one-fourth of all government highway expenditures (FHWA 1997, Table V-21). This allocation depends on some arbitrary assumptions but indicates the current rate of capital expenditure to accommodate truck traffic. Roughly 20 percent of U.S. air carrier revenue is for air cargo.

This list of infrastructure expenditures is incomplete; for example, data are not available on expenditures for port facilities built by private firms or for private facilities built by firms whose main business is not freight carriage. The private sector provides intermodal terminals, warehouses, loading equipment, and other facilities that are elements of the freight transportation system and must be integrated with the publicly provided facilities.

The largest share of freight-related infrastructure expenditure is for highways, paralleling trucking's position in the freight industry—roughly 80 percent of all expenditures for domestic intercity U.S. freight transportation services are for trucking (see Table 3-3 in Chapter 3). State and local governments carry out nearly all road and highway infrastructure spending. They are reimbursed by the federal government for a portion of their capital expenditures (federal aid in 2006 equaled 43 percent of state and local capital spending). State and local governments decide which projects are built and own and operate the completed roads. Railroad expenditures account for the next-largest share and are almost entirely carried out by private firms with private resources.

The federal government directly operates three components of freight infrastructure: the inland waterways, the channels in the harbors of seaports (with contributions from the port authorities for certain projects), and the air traffic control system (which serves passengers as well as air cargo). At seaports, most infrastructure is provided by the public port authorities, although some structures are built by private-sector terminal operators. Airports are operated similarly. Numerous ancillary facilities (e.g., truck and rail terminals, yards, and rail sidings) are provided by private-sector firms.

Programs

The two programs described below are the federal-aid surface transportation program, in operation since 1956, and the Transportation Infrastructure Finance and Innovation Act (TIFIA), a federal program enacted in 1998 to provide credit assistance to major transportation projects. Numerous federal programs provide financial aid for freight infrastructure built by others or directly provide infrastructure; these two are presented as illustrations. The federal-aid surface transportation program is the largest federal commitment to transportation infrastructure, and the structure of the program is a focus of the policy debates that gave rise to this study. TIFIA was the first attempt in federal law to respond to demands for institutionalized assistance for

nationally significant transportation projects that are not well matched to existing federal grant programs.

Federal-Aid Surface Transportation Program

The federal-aid highway program distributed \$31 billion to the states in 2005 for spending on highway construction, equal to 42 percent of all highway capital expenditures that year (FHWA 2007, Table HF-10). This ratio has been fairly constant throughout most of the program's 50-year history. In outline, the program functions as follows (FHWA 1999; TRB 2006, 31–33):

- Periodic federal surface transportation acts provide multiyear authorizations for federal highway and mass transportation capital grant programs, set program rules, and set rates for the federal fuel tax and other highway user taxes. The act divides the total funds into several program categories, each devoted to a particular kind of project (e.g., Interstate highways, bridges, or highway safety).
- The amounts authorized for each year are distributed annually to the states. Most funds are apportioned according to formulas specified in the act for each program category. Formulas include such factors as each state's shares of highway lane miles, vehicle miles of travel, and Highway Trust Fund revenue collections. A state has a degree of flexibility to shift its federal aid from highways to transit projects, and to a very limited extent, from highways to nonhighway freight projects.
- The acts provide contract authority, that is, state spending that incurs a federal obligation may take place as soon as funds are apportioned each year. Congress also establishes an annual ceiling on obligations that typically is somewhat less than the authorization level. Funds are appropriated annually to reimburse the states for the federal share of their expenditures (80 or 90 percent for most kinds of projects).
- The federal highway user taxes collected are credited to the Highway Trust Fund, and payments to states are withdrawn from the fund. The trust fund mechanism is intended to ensure that disbursements equal revenue. Authorizations in the surface transportation acts are limited by the balance in the fund and the projected deposits from user tax revenues.

Federal-aid program rules influence the states' decisions about project selection and design in their transportation programs. The federal program categories influence priorities, designs must conform to federal standards, and states must follow prescribed procedures in developing their capital programs.

The TRB committees that authored *Freight Capacity for the 21st Century* (TRB 2003) and *The Fuel Tax* (TRB 2006) concluded that the structure of the highway finance system (user fees and dedicated trust funds, joint federal–state responsibility, formula allocation of federal aid, and state and local control of project selection) historically has been well suited to its task and has contributed to the success of the highway program in delivering a positive return on the public investment. Both committees recommended maintaining the user-pays principle and better aligning the fees paid by trucks with the cost of providing service (TRB 2006, 3, 5–6; TRB 2003, 125–126). However, freight advocates have argued that the federal-aid program is failing to provide needed freight infrastructure. According to this view, the deficiencies include the following (GAO 2003; AASHTO 2007; TRB 2003, 44–46, 139–141): that project eligibility criteria limit states' ability to carry out freight-related projects (in particular, rail projects); that state and local project selection do not recognize freight mobility benefits and assign low priority

to projects important for freight; that program features add expense and delay to projects; and that the program is chronically undersupported because general political opposition to tax increases has frozen user tax rates.

The American Recovery and Reinvestment Act of 2009 (the economic stimulus package) (Public Law 111-5, February 13, 2009) provided \$29 billion for federal surface transportation aid according to procedures that departed from normal practice. The spending was to be from general revenue rather than debited against the federal Highway Trust Fund, and no state matching shares were required. The act was characterized as a temporary measure. Chapter 3 describes the freight-related surface transportation provisions in the act.

TIFIA

The federal government's 1997 loan of \$400 million to the Alameda Corridor project to build a rail access line through metropolitan Los Angeles to the Ports of Los Angeles and Long Beach was seen as a successful federal intervention. The loan was authorized in a special act of Congress. Other regions asked that similar federal assistance be made available to them. In response, Congress enacted TIFIA as a provision of the 1998 federal surface transportation program reauthorization (TEA-21). It offers federal loans, loan guarantees, or lines of credit to freight or passenger transportation projects meeting eligibility requirements. TIFIA has a cost to the federal government (from the risk of a federal loss if a loan it makes goes into default) and therefore provides a subsidy to projects that make use of the program. However, the magnitude of this subsidy has always been very small compared with total project costs, and TIFIA was not created as a subsidy program. That is, it was not conceived as a means to shift responsibility for infrastructure projects from local interests to the federal government. On the contrary, its provisions were designed to encourage local support. Federal loans and federally guaranteed loans are not to exceed one-third of the total project cost, and project sponsors' debts must be backed at least in part by user charges on the facility constructed or by other dedicated local revenue sources (e.g., a dedicated local tax). The rationale for the program was that federal credit assistance would allow completion of economically sound projects that would otherwise have difficulty obtaining credit commercially on account of their novelty, scale, or other factors.

The demand for TIFIA assistance has been less than its drafters anticipated, and in particular, the program has been little used to aid freight projects. Chapter 3 describes proposals to make the program more useful to freight project sponsors.

Projects

Freight infrastructure projects are diverse in the kinds of facilities they provide, the public and private institutions involved, their sources of funds, and other features of their finance arrangements. Because of this diversity, examining actual projects is the best way to learn about present finance arrangements, the challenges that project sponsors confront, and possible directions for reform of freight infrastructure development practices. Chapter 3 presents case studies and summary descriptions of a variety of projects. The three short descriptions below are intended as an introduction to finance arrangements in a few important recent projects: the Alameda Corridor port access project in Southern California; the Heartland Corridor rail line expansion in Virginia, West Virginia, Kentucky, and Ohio; and an Interstate highway construction project in Louisville, Kentucky. The first two are projects to build facilities serving freight traffic and have novel finance arrangements and exceptional federal involvement. They

illustrate how the most complex projects often have individualized finance arrangements, in part because they do not match routine projects for which the established finance arrangements are designed. The third example, a large bistate highway project, will serve primarily passenger vehicles but also will have high value for freight mobility. Its finance arrangements will mostly follow conventional practices for highway projects, which are the means of paying for the major share of public freight infrastructure construction. The projects are presented not as models of good practices but as an aid in describing current practices.

Alameda Corridor

The Alameda Corridor is the most prominent recent example of an innovative freight infrastructure project developed with public leadership (Shafran and Strauss-Wieder 2003; Alameda Corridor Transportation Authority 2006). It is a 20-mile-long rail line constructed, owned, and operated by the Alameda Corridor Transportation Authority, a public agency, connecting the Ports of Los Angeles and Long Beach to rail yards of the BNSF and Union Pacific railroads. Underpasses and overpasses separate trains from road traffic. Trains carrying containers to and from the ports avoid the older, more circuitous railroad branch lines, which have frequent highway grade crossings. The intended benefits are to reduce harmful community impacts of port traffic and to provide port access capacity to accommodate growth in traffic.

The corridor began operation in 2002. The \$2.4 billion project cost was raised approximately as follows: payments from the ports, \$400 million; state and local government grants, \$400 million; proceeds of bond issues backed by corridor revenue (from container fees paid by its users), \$1.2 billion; and a federal loan, also to be repaid from corridor revenue, \$400 million. The federal loan is subordinate to most of the bonds and was authorized through special-purpose legislation.

The Alameda Corridor was seen as a landmark project, combining the joint efforts of federal, state, and local governments; the ports; and the private sector to alleviate a critical freight bottleneck. However, the project's organizational and financial model has not been fully applied elsewhere. The following are among the features of the project that have proven difficult to replicate:

- The corridor is exceptional among recent public-private freight projects in its reliance, for a majority of the construction cost, on a special revenue source in the form of a fee imposed by the operating authority on the users of the authority's facility. Railroads pay a fee for each container and loaded bulk commodity railcar that they move through the corridor. Although this revenue source may seem natural for similar projects, it has rarely been imitated. (The only similar arrangement may be for the Shellpot rail bridge reconstructed in 2004 by the state of Delaware, which is being reimbursed by a per car toll paid by the railroad.)

- Insofar as the port authorities are public entities, the corridor is a government-led solution to a multimodal freight transportation bottleneck and expands the government's role in rationalizing the regional port access infrastructure. In other locales, governments may lack the interest or the resources to take on the lead role that the ports played in creating the Alameda Corridor.

- Federal involvement was limited but important for the success of the project. The federal government's loan and its willingness to be last in line for repayment significantly reduced the project's borrowing costs and therefore the level of fees necessary to recover its costs. Reaction to the special-purpose legislation that provided the federal loan to the corridor

was one motivation for enactment in 1998 of the Railroad Rehabilitation and Improvement Financing Program and TIFIA.

Heartland Corridor

The Heartland Corridor is a package of improvements to container freight connections between Portsmouth, Virginia, and Chicago (FHWA 2006; Norfolk Southern 2006; Richards 2006; Kaine 2006). The main components are relocation of the rail line in Portsmouth to eliminate highway grade crossings and increase capacity; tunnel modifications to provide clearance for double-stack container trains through the Appalachians along the Norfolk Southern Railroad line; and three new inland intermodal terminals in Virginia, West Virginia, and Ohio. For the railroad, the potential benefits derive from lower costs and increased volume of container traffic from the port terminal it serves to the Midwest. For Virginia, the intended benefits are highway cost savings from diversion of traffic to rail, elimination of passenger–freight conflicts in the Portsmouth urban area, and an improvement in the competitiveness of the port in comparison with other East Coast ports. The line will be important to the private developer of the new Craney Island container terminal at the port.

The estimated cost is \$309 million. The Norfolk Southern is to contribute \$81 million; Virginia, \$57 million; Ohio, \$0.8 million; the Commonwealth Railway (the short line at Portsmouth), \$11 million; and the federal government, \$140 million (FHWA 2006). SAFETEA-LU, the 2005 federal surface transportation legislation, provided \$125 million in earmarked federal funds from the Projects of National and Regional Significance program. According to FHWA, the project’s financial innovation is that it marks “the first time that the private freight rail industry has worked together with U.S. DOT . . . to develop and finance a rail improvement project” (FHWA 2006).

The project is noteworthy in other respects. Project earmarks (i.e., funds that are authorized by Congress for specific projects rather than being shared among the states according to a formula or awarded by federal executive agencies according to criteria specified by Congress) are a controversial but still small part of the federal surface transportation assistance program, and federal financial assistance for freight railroads is controversial, particularly when it is derived from the federal Highway Trust Fund.

Louisville Ohio River Bridges Project

The Louisville–Southern Indiana Ohio River bridges project in Kentucky and Indiana is among the largest current highway projects, one of 68 current federal-aid projects exceeding \$500 million in construction cost listed in FHWA’s Active Major Projects Report (FHWA n.d.). The project will construct two new bridges to carry I-65 and I-265 over the Ohio River and reconstruct an interchange at the convergence of I-64, I-65, and I-71 in downtown Louisville. The present expressway layout requires long-distance traffic to pass through the central urban area to reach the Ohio River bridges. Most of the benefits of the project will accrue to local travelers. However, the location is an important hub for intercity truck transportation. Louisville is at the intersection of three intercity Interstate highways, I-64, I-65, and I-71.

A 2005 FHWA-sponsored study of highway freight bottlenecks identified the interchange of I-64 and I-264 at Louisville as one of the top 25 interchange bottlenecks, ranked by annual hours of congestion delay for large trucks making long-distance trips. The interchange handled 16,400 freight trucks daily in 2004, 9 percent of all traffic (Cambridge Systematics 2005, 5-9).

One of the bridges in the planned project will complete an outer beltway to the northeast of the city, allowing through traffic to bypass the I-64–I-264 interchange on the inner beltway and the downtown bridges.

A final environmental impact statement for the project was approved in 2003, design and right-of-way acquisition are under way, construction is to start in 2009, and completion is scheduled for 2024 (FHWA n.d.). The protracted schedule presumably reflects, in part, the expected availability of funds.

The estimated cost is \$4.1 billion. Funds will be provided from a mix of conventional and unconventional sources, including regular federal highway aid to the two states and a specially earmarked federal grant for a small share of the total. Kentucky will issue Grant Anticipation Revenue Vehicle bonds, which are bonds backed by the state's expected future receipts of federal highway aid funds. A major share of Indiana's contribution will be from the state's Major Moves program, which is distributing the state's lease proceeds from the concession it granted to a private firm in 2006 to operate the Indiana Toll Road. Kentucky is considering tolls on the new facilities and has studied alternative tolling arrangements, but the legislature has not yet made a decision on whether tolls will be used (Kentucky Transportation Cabinet and Indiana Department of Transportation 2008).

The Louisville bridges project is not the kind of project that typically is cited in discussions of freight infrastructure finance, and freight mobility was not the foremost consideration in its planning. However, highways are the major component of the freight infrastructure, and the federal and state highway programs are the source of most freight infrastructure spending. As this project illustrates, relieving highway bottlenecks that slow freight will be expensive in urban areas, where passenger travel is the predominant concern and reducing conflicts between passenger and freight traffic will be an important design goal. Because of the scale of such projects, finance arrangements will be challenging.

Policy Questions from the Examples

Although these examples do not represent the full range of public-sector freight project finance arrangements, they suggest some summary observations about the challenges of paying for major freight-related projects and possible shortcomings of existing finance arrangements. For the Interstates and other highway freight routes, a highly organized program, with wide acceptance from the public and the interested groups, has provided funds and direction for hundreds of billions of dollars of construction over the past 50 years. However, increasingly in the past two decades, governments have been responding to perceived public needs for investment in kinds of projects that are new to the public sector, including facilities that previously would have been built by the private sector (e.g., rail lines) and mixed-mode facilities. The new projects almost always are institutionally complex; that is, their completion requires the cooperation of numerous jurisdictions and private-sector firms; and in many cases no single entity is prepared to exert strong leadership. For these new projects, governments have been improvising finance arrangements, employing revenue sources ranging from container fees to lottery tickets. In addition, within the traditional scope of the federal and state highway programs, projects such as the Louisville bridges illustrate that adding capacity in some locations has become enormously expensive and time-consuming, straining the capacities of the established programs.

The examples illustrate varying solutions to the problems of selecting projects, providing funds, and delineating government and private-sector responsibilities. Some but not all of the finance arrangements involve formal tests and procedures for determining whether public

benefits of the projects are worthwhile, and some embody market constraints. Revenue sources in the projects and programs include facility-specific fees (Alameda Corridor), pooled funds of user-tax revenue (the federal-aid highway program), and general or nonuser revenue. By examining the various arrangements, it should be possible to determine that some are structurally better at promoting efficient investment decisions and operating practices. Finally, the examples show steps toward expanding the government role in some activities (e.g., rail freight). At the same time, tentative steps are being taken elsewhere toward contracting the government role (e.g., private-sector road developments and toll road operating concessions to private firms, some of which have received TIFIA loans). The examples suggest that rules today for determining whether a project should be provided by the government, should be promoted by government, or should receive taxpayer support are vague and that a more systematic or uniform approach to public participation in nonhighway freight projects might be useful.

CONCLUSIONS OF EARLIER TRB COMMITTEES ON FINANCE POLICY

Previous TRB studies on related topics provided a starting point for the work of this committee. *The Fuel Tax and Alternatives for Transportation Funding* (TRB 2006) considered the adequacy of fuel taxes and other present user fees to serve as the basis of public surface transportation finance; *The Marine Transportation System and the Federal Role* (TRB 2004) examined management and finance arrangements for the diverse federal responsibilities with regard to ports and waterways; *Freight Capacity for the 21st Century* (TRB 2003) examined the potential of improvements in investment decision making, finance arrangements, and operating practices to help the freight system handle growth; *Policy Options for Intermodal Freight Transportation* (TRB 1998) identified changes in federal transportation policy that could promote intermodal freight transportation efficiency; and *Landside Access to U.S. Ports* (TRB 1993) considered the problem of serving inland traffic to and from seaports.

Related TRB policy studies compared the social costs of truck, rail, and water transportation [*Paying Our Way: Estimating Marginal Social Costs of Freight Transportation* (TRB 1996)] and recommended coordinated reforms in truck fees and truck size and weight regulations [*Regulation of Weights, Lengths, and Widths of Commercial Motor Vehicles* (TRB 2002)]. In addition, the Water Sciences and Technology Board of the National Research Council, together with TRB, evaluated the Corps of Engineers' planning for improvements to the locks and dams on the Upper Mississippi, a case study of evaluation and pricing issues in a public freight infrastructure project (NRC 2001; NRC 2004).

The TRB studies examined government policies extending beyond finance; however, the committees concluded that finance arrangements are linked to all the main policy questions concerning infrastructure. The following subsections summarize the earlier committees' conclusions on four topics to which the present committee's charge refers: the rationale for public involvement in freight infrastructure finance, the scope of finance strategies, criteria for evaluating finance options, and the definition of national significance.

Rationale for Public Involvement

Four kinds of activities directly involve government in the freight transportation industry: government plans and builds infrastructure, operates transportation facilities, raises funds from taxes and user fees to pay for construction and operation of facilities, and imposes regulations

(e.g., with regard to traffic management, pollution, safety, and carrier competition) on the operation of facilities and freight services. (Through the Postal Service, government also is a provider of freight services; otherwise, all freight services are provided by the private sector.) These activities are interdependent; in particular, finance arrangements influence which projects are constructed, and pricing is a mechanism for managing the operation of facilities (TRB 2003, 122–123).

The scope of government responsibilities for freight transportation differs internationally among the high-income countries, and in the United States responsibilities differ from mode to mode for reasons related to the historical path of development of the transportation system as well as to technical differences among the modes. In the United States and globally, government roles are changing, and proposals for improving transportation system performance often entail changes in government responsibilities (for example, proposals for privatization of facilities such as the air traffic control system, devolution of responsibilities from the federal to state and local governments, and government financial assistance to freight railroads).

The TRB committee that authored *Freight Capacity* proposed the following guidelines for establishing the scope and objectives of government freight programs (TRB 2003, 120):

- Economic efficiency ought to be the primary goal of government transportation policy; that is, capital improvements and operating practices for public facilities should be selected that yield the greatest net economic benefit, considering all costs.
- Government involvement should be limited to circumstances in which market-dictated outcomes would be far from economically efficient. Such circumstances include preventing exercise of monopoly power and dealing with nonmarket costs. Government also . . . has a historically established responsibility (for certain facilities) that could not feasibly be altered in the near term. . . . The federal government is responsible in instances where a conflict exists between nationwide and local interests. . . .
- A government responsibility to provide facilities or leadership in developing a project does not necessarily justify government subsidy of the costs. Reliance on revenue from users will increase the likelihood that the most worthwhile improvements will be carried out and that facilities will be operated and maintained efficiently.

The TRB committee that authored *Intermodal Freight* examined circumstances in which a project could yield a net benefit to the public and yet not attract sufficient private-sector support: it could reduce external pollution and congestion costs, generate external economic development benefits (i.e., allowing efficiencies beyond those recognized by the shippers and carriers using the facility), or offset the harmful effects of preexisting subsidies in the freight market (as when the existence of subsidies to trucks is cited as justification for subsidies to railroads) (TRB 1998, 30–35).

Both committees intended the criteria to be restrictive, arguing that the circumstances justifying government involvement are likely to be less common than proponents of government aid for particular projects may aver. They recommended that projects under consideration for government involvement pass quantitative tests, using standardized evaluation methods, to show that they meet the criteria. However, the committees found that governments commonly lack the expertise and incentives to conduct such evaluations. Finally, both argued that public investment

or subsidy often will not be the most cost-effective remedy for the underlying source of inefficiency. For example, rather than subsidize rail infrastructure to divert traffic from highways, governments could raise the fees paid by highway users to bring them in line with the cost of providing additional service (TRB 2003, 119–122; TRB 1998, 30–37).

The *Freight Capacity* committee recommended an integrated federal freight policy. It concluded that the tendency in policy debates to define federal freight policy primarily in terms of grant and credit programs is myopic. Through an array of federal activities—building and operating infrastructure, disbursing grants to state and local governments, environmental and safety regulation, imposition of transportation user taxes and fees, and general taxation—the federal government exerts far-reaching influence on freight system performance and capacity development.

Scope of Project Finance

The earlier TRB committees argued that finance policy options must be defined in a way that takes into account the inevitable connections among practices with regard to sources of funds, pricing, facilities operation, project selection, and governance. The *Fuel Tax* committee concluded that a comprehensive public infrastructure finance reform package would contain four elements (TRB 2006, 121–123): a defined goal for the package, with reference to overall transportation policy goals; an assignment of responsibilities for finance arrangements and for governance among the federal, state, and local governments and the private sector; rules governing user fees and pricing; and rules governing decision making on budgets, project selection, and disposition of revenues generated by facilities. In Chapter 5, this framework will be used to examine some prominent recent proposals for transportation finance reform.

Evaluating Finance Options

The *Fuel Tax* committee reviewed a series of high-level studies conducted by states and the federal government that considered reforms of transportation finance and tax policy (TRB 2006, 11–15, 62–68). It concluded that “the criteria that the states and Congress recognize [for evaluation of finance and revenue options] are revenue adequacy, fairness, and administrative practicality. . . . Explicit consideration of how changes in user fees and other funding arrangements will affect transportation system performance or the economic benefits derived from transportation programs seldom enters into finance or fee decisions” (TRB 2006, 68). The revenue adequacy criterion is emphasized in the most commonly stated diagnosis of the overall freight infrastructure finance problem: that the transportation system suffers from a gap between the rate of spending that would allow service to be maintained and improved and the spending that the public and private sectors are willing to undertake; and that in the public sector, this gap is the result of bias against projects important for freight in spending decisions, arbitrary restrictions on project eligibility in aid programs, and unwillingness of elected officials to increase the special taxes that provide the funds for most government transportation spending (USDOT 2001; GAO 2003; U.S. Chamber of Commerce 2007).

The *Fuel Tax* committee as well as the TRB *Freight Capacity* and *Intermodal Freight* committees concluded that this conventional approach to evaluating finance options in the public sector is insufficient. They argued that capacity problems are to a great extent attributable to inefficient operating practices on publicly provided facilities and poor targeting of public investment to high-payoff improvements; that finance arrangements are a major determinant of

performance, affecting the quality of investment decisions as well as the efficiency of operations; and that finance options should be evaluated in terms of these effects on operations and investment decisions.

The *Freight Capacity* committee endorsed higher spending in the federal surface transportation aid program. It concluded that, by themselves, increased spending and technology advances will be unable to sustain freight transportation productivity growth indefinitely, but that greater reliance on pricing and market forces to manage facilities and guide investment decisions could do so. The committee observed that “the present inefficient use of much existing transportation capacity should be regarded as a large hidden capacity reserve waiting to be tapped through improved management practices” (TRB 2003, 121).

National Significance and the Federal Role

The TRB *Intermodal Freight* committee traced the history of the term “project of national significance” in discussions of federal freight infrastructure policy (TRB 1998, 54–61). It found that the term had been used almost exclusively to indicate a criterion for judging whether a project requires or merits federal government participation. However, the committee concluded that high “national significance” of a project, defined in terms of its impact on the operation of the transportation system, does not necessarily imply that federal involvement is required:

A project of national significance may be defined as a freight project that has important consequences for the performance of the nationwide freight system. State and local governments often carry out such projects without need of federal leadership. A project of national significance that entails a federal responsibility is one for which government involvement is justified and that state and local governments are unable or unsuited to carry out because the national interest differs from the local, because of the scale of the project, or because essential federal responsibilities are involved (e.g., customs). (TRB 1998, 100–101)

The committee concluded that, as a general rule, it would be appropriate to continue the established practice in which state and local governments and private parties take the lead on projects and seek federal participation; that is, a new, broadly defined primary federal role in identifying and developing such projects is not needed. The federal government’s policy problems then are choosing which locally developed projects it should support and deciding the form that its participation should take. The TRB committee offered guidelines on these questions (TRB 1998, 101) but did not propose any detailed organization for a federal program.

The TRB *Freight Capacity* committee also proposed stringent guidelines for federal financial assistance programs for large multimodal or nonhighway freight projects: such programs should sustain the user-pays principle that underlies the existing federal-aid highway program (i.e., costs should be paid from revenues derived from direct users of the facilities), the programs should incorporate mechanisms to ensure that the projects built are those that the fee payers recognize as having the greatest value, and federal policy for correcting imbalances in competition among the freight modes should rely on adjustments to user fees rather than on payment of offsetting subsidies (TRB 2003, 128–129).

OUTLINE OF THE REPORT

The remainder of this report is organized as follows. Chapter 2 examines the performance of the freight transportation system, the threats to continued productivity growth, and the relationship between performance and finance arrangements. Chapter 3 summarizes freight transportation infrastructure finance arrangements today, with the aid of examples and observations from case studies of freight projects that the committee commissioned. Chapter 4 considers how the national significance of a freight project can be defined and the problem of determining the scope of federal government responsibilities for freight infrastructure. Chapter 5 summarizes proposals from a variety of sources for reforms of public-sector finance arrangements for transportation projects. Chapter 6 presents the committee's findings and recommendations.

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Abbreviations

AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
BEA	Bureau of Economic Analysis
BTS	Bureau of Transportation Statistics
CBO	Congressional Budget Office
FHWA	Federal Highway Administration
GAO	General Accounting Office
MARAD	Maritime Administration
NRC	National Research Council
TRB	Transportation Research Board
USDOT	U.S. Department of Transportation

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Freight System Performance and Infrastructure Finance

As Chapter 1 explained, the committee's charge arose from the concerns of public- and private-sector participants that present finance arrangements for freight infrastructure are inadequate and that the performance of the freight transportation system is suffering as a consequence. This chapter examines trends in system performance and evidence that performance is related to finance arrangements.

The first section below cites industry participants' descriptions of failings in system performance and in finance practices, for freight transportation and for U.S. transportation as a whole, to illustrate perceptions of the problems confronting the system. The section also reviews the conclusions on the relation of system performance to finance in the Transportation Research Board (TRB) committee report *Freight Capacity for the 21st Century* (2003). The second section surveys the limited available data on trends in freight transportation system performance, that is, the reliability, speed, and cost of goods movement. The section also describes trends in freight infrastructure spending, the stock of infrastructure, and freight traffic. These measures—in particular, the gap between the rates of growth of traffic and of infrastructure—often are cited in support of proposals to increase public investment. The third section considers the extent to which any of the problems and challenges facing the freight system are related to finance arrangements. The final section is a summary. Throughout the chapter, a recurring difficulty is the near absence of systematic information about the performance of public-sector transportation facilities or about returns on public investments.

VIEWS ON FINANCE PROBLEMS

A representative statement of the infrastructure problem (referring to passenger as well as freight facilities) is from a statement of the U.S. Chamber of Commerce (U.S. Chamber of Commerce 2007):

The nation's transportation infrastructure is in crisis. Without significant repairs and new construction, our aging roads, bridges, and transit cannot begin to handle the growing transportation needs that commuters, emergency responders, truckers and delivery drivers, and law enforcement require on a daily basis. To begin facing this enormous challenge, we need to commit adequate resources while finding new and creative ways of financing the new construction and repair of existing roads, bridges, and transit as quickly as possible. Policy makers in Congress and the Administration need to recognize the enormous impact that our deteriorating transportation infrastructure is having on the economy and the health and safety of our citizens. We need their strong commitment to address this growing crisis if we are to make the necessary and often difficult financial decisions that will resolve this transportation crisis.

An earlier Chamber of Commerce–sponsored study (Cambridge Systematics 2005a, 1) described a “funding shortfall that immediately threatens national mobility” and identified a variety of possible revenue enhancements to support increased federal and state government spending.

A similar characterization of transportation finance inadequacies is found in recent testimony of a finance sector executive before a House committee (Florian 2008):

The nation’s transportation system is in a crisis because current funding sources and financing tools are insufficient to maintain and improve this country’s highways, public transportation systems, and intermodal connectors. . . . [T]he continued availability of abundant and efficient transportation infrastructure is critical to the economic growth and prosperity of our economy, and to the quality of life of individual Americans. I believe that this problem can be expressed in several key observations: Demands on our transportation system are outpacing investment in it. For example, Vehicle Miles Traveled . . . on U.S. highways have doubled in the last 25 years, but capacity on our highway system is up only 3 percent. Maintenance costs of existing transportation assets are competing for the same funds needed to expand our transportation system. . . . Construction inflation has accelerated, up 40 percent cumulatively in the last 3 years. . . . The fuel tax . . . is no longer sufficient to meet the large and growing needs for transportation infrastructure development in the United States.

The same concerns and diagnoses are expressed by public officials. A statement of the American Association of State Highway and Transportation Officials, prepared to advise the National Surface Transportation Policy and Revenue Commission created in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users, describes freight problems as follows (AASHTO 2007, 58):

The nation is entering the early stages of a freight transportation capacity crisis. All systems are aging and stretched to capacity. Highways, railroads, ports, waterways, and airports all require investment well beyond current levels to maintain, much less improve, their performance. Projections of freight volume increases reveal that the nation is unprepared and is not preparing fast enough for the freight increase. A recent report forecasts a four-fold increase of container volumes in Los Angeles, Houston, and Savannah, near tripling of volumes at the ports of New York/New Jersey, Charleston, and Virginia, and greater than doubling at the ports of Miami, Tacoma, and Oakland. These volumes will overwhelm the ports and the surface freight system in each of these metropolitan areas.

The characterization of the General Accounting Office (GAO, later renamed the Government Accountability Office) (GAO 2003), in a review of proposals for freight finance provisions in the federal surface transportation aid program, was that “increasing congestion within the freight transportation system poses a threat to the efficient flow of the nation’s goods” and that “congestion delays that significantly constrain freight mobility [at ports, border crossings, and distribution hubs] . . . could result in serious economic implications for the nation” (GAO 2008, 1). GAO does not cite estimates of the spending gap between outlays and needs but

states that among the “challenges” faced by government planners in advancing freight projects is “limited and restricted availability of public funds available for freight transportation” (GAO 2008, Highlights page).

GAO observes that “there is a growing concern that the current funding structure [of federal programs for transportation infrastructure] is not well suited to advancing freight improvements and that additional action might be needed to better allocate federal funds in order to address impediments to freight mobility” (GAO 2008, 2). The two failings of the present structure that GAO cites are bias in project selection in favor of passenger-oriented projects (“state and local planners are more likely to fund projects that directly benefit passengers in their localities rather than freight traffic that moves through the region”) and that “[federal] funding sources have remained largely tied to individual modes” (GAO 2008, 2), apparently referring to restrictions in the federal-aid highway program that prevent states from using federal grants for rail projects (GAO 2008, 37).

The consequence of failure to act to redress the capacity deficiency, in the view of a federal official, would be to risk a general failure: “[The] U.S. is exposed to a major breakdown in the flow of commerce that would significantly impact the U.S. economy” (Shane 2006).

In summary, the consistent points in the frequently expressed criticism is that the transportation system suffers from a gap between the rate of spending that would allow service to be maintained and improved and the spending that the public and private sectors are willing to undertake. The gap is widening to the point of crisis; the evidence of the crisis is growing congestion and physical deterioration. In the public sector, the gap is the result of bias in spending decisions against projects important for freight; arbitrary restrictions on project eligibility in funding programs, especially the federal-aid program; and unwillingness of elected officials to increase the special taxes that fund most government transportation spending.

Statements of this criticism usually refer to general, systemwide levels of investment, rather than to specific bottlenecks requiring solutions, or else cite examples from the small group of most prominent bottlenecks (e.g., the Southern California ports and the Chicago rail hub). Overall trends in traffic growth are the primary evidence of need cited; as will be described below, data that would directly demonstrate declining freight performance are not available. The criticism is not new; essentially the same concerns prompted two TRB policy studies concerning freight capacity (TRB 1993; TRB 1998).

A comparison of the criticism summarized above with results of a survey of industry participants reveals a divergence of views. The 2005 survey of 500 shipper executives, carrier executives, and government administrators by the Massachusetts Institute of Technology (MIT) Center for Transportation and Logistics found that “perceptions in the causes and remedies of the congestion crisis differ between the government and private sectors” (Caplice and Blanco 2006, 5). When asked to rank a list of 29 “potential root causes” of the current (in 2005) freight congestion situation, government respondents ranked “lack of funding for freight infrastructure by the state governments” second and “lack of funding for freight infrastructure by the federal government” third; carriers ranked these two potential causes 11th and ninth, respectively; and shippers ranked them 14th and 10th. Carriers’ top three root causes were “West Coast port congestion,” “growth of international imports,” and “highway congestion near metropolitan areas”; shippers’ top three were “driver shortages in the long-haul trucking industry,” “growth of international imports,” and “West Coast port congestion.” Government respondents’ top choice was “highway congestion near metropolitan areas” (Caplice and Blanco 2006, 7–8) (see Table 2-1). While it may be circular to cite congestion as the cause of “the current

TABLE 2-1 Root Causes of Freight Congestion According to Shipper, Carrier, and Government Survey Respondents

	Rank		
	Shipper	Carrier	Government
Driver shortages in the long-haul trucking industry	1	5	11
Growth of international imports	2	2	5
West Coast port congestion	3	1	6
Highway congestion near metropolitan areas	4	3	1
Volatility of fuel prices	5	16	12
Lack of 24/7 operations in West Coast ports	7	4	9
Lack of funding for freight infrastructure by the federal governments	10	9	3
Lack of funding and investment in high-priority projects by the railroads	12	8	4
Lack of funding for freight infrastructure by the state governments	14	11	2

NOTE: The survey question was as follows:

Freight transportation congestion across all modes has been listed as the most critical issue for shippers and carriers alike for the last 18 months. What do you think are the root causes of the current situation?

1. Please rate each of the potential root causes listed below as to its significance in causing the current congestion crisis. No Impact Moderate Impact Significant Impact Very Significant Impact [followed by a list of 29 potential root causes].

SOURCE: Caplice and Blanco 2006.

congestion crisis,” one interpretation of the shippers’ and carriers’ responses is that they are emphasizing the need to correct problems at specific bottlenecks. The responses indicate that the shippers and carriers do not see chronic systemwide infrastructure underfunding as among the most important root causes of their congestion problems.

The MIT survey findings parallel conclusions that the TRB *Freight Capacity* committee drew from a series of informal interviews with freight transportation industry executives. Interviewees frequently cited capacity constraints other than infrastructure, including labor supply shortages and regulatory factors (truck size and weight regulations and international border delays), and noted that continual change in the characteristics of freight demand is a fundamental source of mismatches between capacity and demand (TRB 2003, 102–103, 116–118).

In its conclusions, the *Freight Capacity* committee offered an alternative perspective to the criticism outlined above. The committee found that because governments do not measure returns on infrastructure investments, evidence is lacking to support claims of underinvestment or of systematic misallocation in government investment decisions in favor of projects primarily serving passengers over projects of particular importance to freight. The committee endorsed higher spending in the federal surface transportation aid program. However, it concluded that increased spending alone would be unable to sustain freight transportation productivity growth; greater reliance on pricing and market forces to manage facilities and guide investment decisions would be essential as well. In the absence of finance reform, the committee foresaw protracted decline rather than collapse (TRB 2003, 111–112):

The trends show evidence of the emergence of social and political forces that will influence freight transportation development in new ways in the next decades. Increasing population density, urbanization, and wealth ensure that conflicts between freight and passenger traffic; conflicts between freight transportation and residential, recreational, and other competing land uses; and requirements to control pollution will increase. These forces will tend to increase the cost of expanding capacity and add to the risk of investment.

As congestion worsens, demand for increased public spending will appear. The United States has ample resources for expanding the transportation system; in most regions, the densities of population, employment, transportation networks, and traffic are low in comparison with the Northeast or with western Europe.

If capacity addition does lag traffic growth and congestion worsens, as seems likely, the long-run consequence will not be massive breakdown. Freight markets have self-correcting capabilities. Users will make numerous adjustments over time to accommodate or avoid congestion. Shippers will change logistics practices, for example, by shipping more in bulk and holding larger inventories than they would if freight transport were cheaper. From a close-up perspective, these long-term repercussions of congestion may not be evident. One of the most important coping mechanisms will be changes in land use and in the location of activities: workplaces and residences will move away from congestion within metropolitan areas and from more-congested to less-congested regions within the United States. Such adjustment has been the most important means of accommodating growth throughout U.S. history. Congestion will be a constraint on the growth of some urban areas. Some production will move from the United States to other countries if congestion costs cause the United States to lose comparative advantage in some industries.

Therefore, one plausible course of development is that the nation will continue to accommodate growing freight traffic volumes by increasing capital spending on infrastructure, accepting more congestion, altering production and logistics practices, and moving away from the most congested locations. This resolution might be tolerable, but will certainly be far from the economic optimum, for two reasons. First, the available capacity will continue to be used poorly on those parts of the system where users do not pay prices that reflect costs and where operators lack incentives to be responsive to user costs and preferences. Second, obstacles exist to effective targeting of capital expenditures, particularly in the public sector. Public capital spending will dissipate much of its impact because some high-payoff projects are passed by and some low-payoff ones are carried out. Private-sector capital expenditure may not be efficient if a suboptimally small number of firms dominate a market, hindering competition.

The potential future costs of delay and other direct consequences of congestion can be estimated, but other costs of this “business-as-usual” scenario—for example, the costs of distortion of land use and regional development patterns—are difficult to observe or predict. Changes in government policy that would allow the nation to make better use of existing capacity and [better] investment decisions, compared with this scenario, would have important economic benefits.

In short, the obstacles to reducing the cost of freight transportation are rising input costs (from growth in population, income, and environmental awareness) and continued tolerance of inefficiencies that result from the established practices for selecting investments and charging for use of publicly provided facilities.

This alternative diagnosis of the fundamental weakness in transportation finance arrangements—emphasizing inefficient operations and poor targeting of investment rather than a gap between spending and needs—has been repeated more recently by other observers. For example, the Secretary of Transportation in 2007 described highway finance failings as follows (Peters 2007):

We have an increasingly flawed investment model and a system performance crisis. . . . The underperformance in the highway sector is fundamental, not incremental. In other words, an increase in federal taxes and spending would likely do little, if anything, without a more basic change in how we analyze competing spending options and manage existing systems more efficiently. . . . The degree to which one capital investment generates more returns than a competing investment is the most basic question asked in virtually every other capital intensive sector. . . . Yet, when it comes to . . . highways . . . , there is virtually no analysis of this question.

The recession that began in December 2007 reduced traffic and congestion throughout the transportation system; therefore, the immediate conditions that gave rise to the statements above no longer pertain. Performance problems that were evident during the previous economic expansion may reemerge with economic recovery, but the recent experience highlights the necessity of distinguishing long-term trends from normal cyclical patterns and unique events in diagnosing freight system problems. Regardless of how the performance and finance trends of the past two decades are characterized, broad agreement exists that historical methods of developing freight infrastructure will become increasingly inadequate in the future. Finance reform will be a necessary element of any national program to build and manage infrastructure more efficiently.

TRENDS IN FREIGHT TRANSPORTATION SYSTEM PERFORMANCE

The purpose of any proposal to reform freight infrastructure finance will be to improve the future performance of the freight transportation system. That is, the goal is a system that provides diverse services to shippers at lower public cost (including shippers' transportation and logistics costs, external impacts like pollution, and the cost to taxpayers if they pay for public infrastructure programs). The cost of freight transportation will depend on the investments that are made in the system, the operating efficiency of facilities, and application of new technology, as well as on a variety of external factors. Finance proposals usually are prefaced with observations about inadequate performance at present or to be expected in the future. This section reviews evidence on characteristics of the freight transportation system that are related to performance. It summarizes and updates the examination of freight performance in the report of the TRB *Freight Capacity* committee (TRB 2003, 50–103). The first two subsections below examine congestion, the primary physical indicator of performance, and shipper and

infrastructure costs, the economic measure. Data are not yet available to show systematically the effects of the recession that began in December 2007 on these measures. The final two subsections address trends that are frequently cited in support of funding proposals: the rate of investment and capital stock growth compared with traffic growth, and projections of future traffic levels that the system will be serving.

Congestion

Data are presented below concerning congestion on highways, freight railroads, and other modes. Congestion by itself is not an adequate measure of the performance of a transportation system. Even the most efficiently operated facility will experience occasional congestion because transportation demand varies with time and because public benefits and (in the case of private-sector facilities) operators' profits usually are maximized by allowing some degradation of service quality during peak periods rather than by restricting use to the point that traffic flow is never hindered. Efficient operation of a congested facility serving commercial freight traffic requires (a) avoiding gridlock conditions (that is, a circumstance where throughput nearly stops because too much traffic has been allowed to enter the facility) and (b) giving priority to the freight movers who will gain the most from use of the facility. For example, at a congested port, shipments of high-valued or time-sensitive goods should be able to gain priority over shipments of low-value commodities.

Highways

Highways are the nation's major freight transportation infrastructure system. Freight and passenger traffic share the same facilities, and with few exceptions, the worst bottlenecks for highway passenger transportation are also major freight bottlenecks. Therefore, highway congestion is an important indicator of freight system performance.

The Texas Transportation Institute's (TTI's) *Urban Mobility* reports (Schrank and Lomax 2007) have become the accepted authority on urban highway congestion trends. The U.S. Department of Transportation (USDOT) now uses the TTI estimates as its principal congestion indicator in its biennial report to Congress on the conditions and performance of the U.S. highway system (USDOT 2007, 4-2-4-14). They are cited as evidence of underinvestment by GAO (GAO 2008, 12) and are the primary source on congestion referred to by the National Surface Transportation Policy and Revenue Study Commission (2007, 3-13).

According to the TTI estimates, congestion delay in 437 U.S. urban areas grew from an average of 14 hours annually per peak period traveler in 1982 to 38 hours in 2005, a 170 percent increase, and the costs of congestion (including the value of lost time to passengers and commercial traffic and extra fuel costs) grew from \$15 billion in 1982 to \$78 billion in 2005 in 2005 dollars, a 420 percent increase (Schrank and Lomax 2007, 1). The study's assumptions about traffic volumes and time costs imply that costs borne by operators of commercial vehicles account for about 20 percent of the total, or \$16 billion annually, equal to 2 to 3 percent of shippers' total annual expenditures for truck freight transportation (Council of Supply Chain Management Professionals 2008). The most congested metropolitan areas are estimated to have delays 50 to 90 percent worse than the national average: 72 hours per traveler per year in Los Angeles and 60 hours in San Francisco and Washington, D.C. Furthermore, congestion is estimated to be growing much faster in certain metropolitan areas than the national average, with

1995–2005 increases of 24 hours per traveler per year in Dallas and Houston, 22 hours in San Diego, and 17 hours in Portland, Oregon, compared with an average of 7 hours for the decade for all urban areas (Schrack and Lomax 2007, 78).

The derivation of the TTI congestion estimates does not rely on metropolitan area speed data or data on trends in highway speeds. Instead, the estimates are derived from data on traffic volume [annual average daily traffic (AADT)] for a sample of road segments in each metropolitan area in the Highway Performance Monitoring System database maintained by the Federal Highway Administration (FHWA) and from national average relationships between AADT and peak volume and between volume and speed (TTI n.d., 6-11). The documentation of the TTI estimates does not report any comparison with direct measurements of congestion or travel times; therefore, the validity of the estimates is unknown.

USDOT ceased collection of nationwide data on highway speed in 1994, and few states compile systematic and timely speed data (OECD and ECMT 2006, 255). Therefore, no information derived from observation exists about the nationwide extent, characteristics, or time trends in highway congestion.

An indicator of congestion based on actual reported travel times is found in the decennial censuses (Bureau of the Census n.d. c) and the annual American Community Survey (Bureau of the Census n.d. a; Bureau of the Census n.d. b). The average travel times to work for workers outside the home, from survey responses, are as follows:

<i>Year</i>	<i>Travel Time, One Way (minutes)</i>
2006	25.0
2000	24.4
1990	22.4
1980	21.7

Of course, the travel time changes depend not only on changes in the speed of travel but also on a variety of factors including changes in use of transit and in the location of residences and workplaces over the period. However, location changes are driven in part by travel costs, so any added time required for commuting over the period as a result of workers moving their residences farther away from their jobs is to an extent a reflection of congestion impacts. The census data imply that the average commuter spent 27 hours more per year traveling to and from work in 2006 than in 1980, a 15 percent increase in 26 years.

The census data are not necessarily inconsistent with the TTI estimates, but they offer a contrasting perspective on trends in congestion and travel delay:

<i>Item</i>	<i>Percentage Change</i>
TTI annual delay per peak traveler, 1982–2005	+171
TTI annual congestion cost, 1982–2005	+425
Census average travel time to work, 1980–2006	+15

The percentage changes appear different because of differences in the base from which each change is computed. TTI reports changes in excess travel time, starting from a year in which excess travel time is estimated to have been relatively small; the percentage change from the census data is the change in total travel time.

In an exceptional actual measurement of highway system travel times and speeds, FHWA, with trucking industry cooperation, analyzed data on truck movements over a 1-year period (calendar year 2005) collected from 250,000 commercial trucks equipped with automatic vehicle location devices, for travel on five major Interstate corridors totaling 7,000 miles and accounting for one-fourth of all commodity-carrying truck vehicle miles (Mallett et al. 2006). The corridors, average speeds observed, and buffer indices (a measure of travel time reliability) were as follows:

<i>Corridor</i>	<i>Average Speed (mph)</i>	<i>Buffer Index (percent)</i>
I-5, California–Washington	50	19
I-10, California–Florida	56	21
I-45, Texas	54	31
I-65, Alabama–Indiana	58	7
I-70, Utah–Maryland	54	11

The analysis excludes time for rest, refueling, or delivery stops. The buffer index is an estimate of how much earlier a truck would need to depart from an origin at one end of the corridor (expressed as a percentage of the average trip time) to have a 95 percent chance of arriving at a destination at the other end within the average trip time. The I-45 corridor appears the least reliable by this measure because it is the shortest corridor (times for shorter trips will almost always be more variable, in percentage terms, than times for longer trips because delays tend to average out over a long itinerary) and because a high percentage of its length is through urban areas. I-5 has the lowest average speed in part because the truck speed limit over a large portion of the route is 55 mph.

The FHWA data indicate that intercity truck traffic operates fairly unimpeded over much of the highway system. Trucks encounter substantial delays in certain urban areas, but not in all. Trucks on I-5 were significantly delayed at San Diego, Los Angeles, Portland, Seattle, and near the Canadian and Mexican borders, but on I-65, trucks encountered only minor or no delays at Mobile, Montgomery, Birmingham, Nashville, Louisville, Indianapolis, and Gary. This observation is consistent with estimates of truck congestion costs by a TRB committee that studied the social costs of freight transportation. The TRB estimates indicate that nearly all congestion costs of long-distance truck travel are incurred in urban areas and that these costs are highly sensitive to time of day. For example, if a truck can time its departure so that it passes through intermediate urban areas at night, most congestion costs are avoided (although any cost of altering operating practices to avoid congestion is itself a cost of congestion) (TRB 1996, 94–95, 109).

The FHWA truck travel time measurements are an excellent example of the kind of monitoring that would provide useful information about freight system performance. Although the report of the 2005 results states FHWA's intent to continue the monitoring, no further data have been published.

Another FHWA study highlights the concentration of highway freight capacity problems at a small number of urban bottlenecks. Using the same method for estimating congestion that is used in the *Urban Mobility* reports, the study identified locations that account for large travel time losses for freight trucks. The map in Figure 2-1 shows expressway interchange bottlenecks. They account for 80 percent of expressway recurring congestion delay for trucks, according to the study estimates, and 20 percent of all truck congestion delay [the remainder is primarily

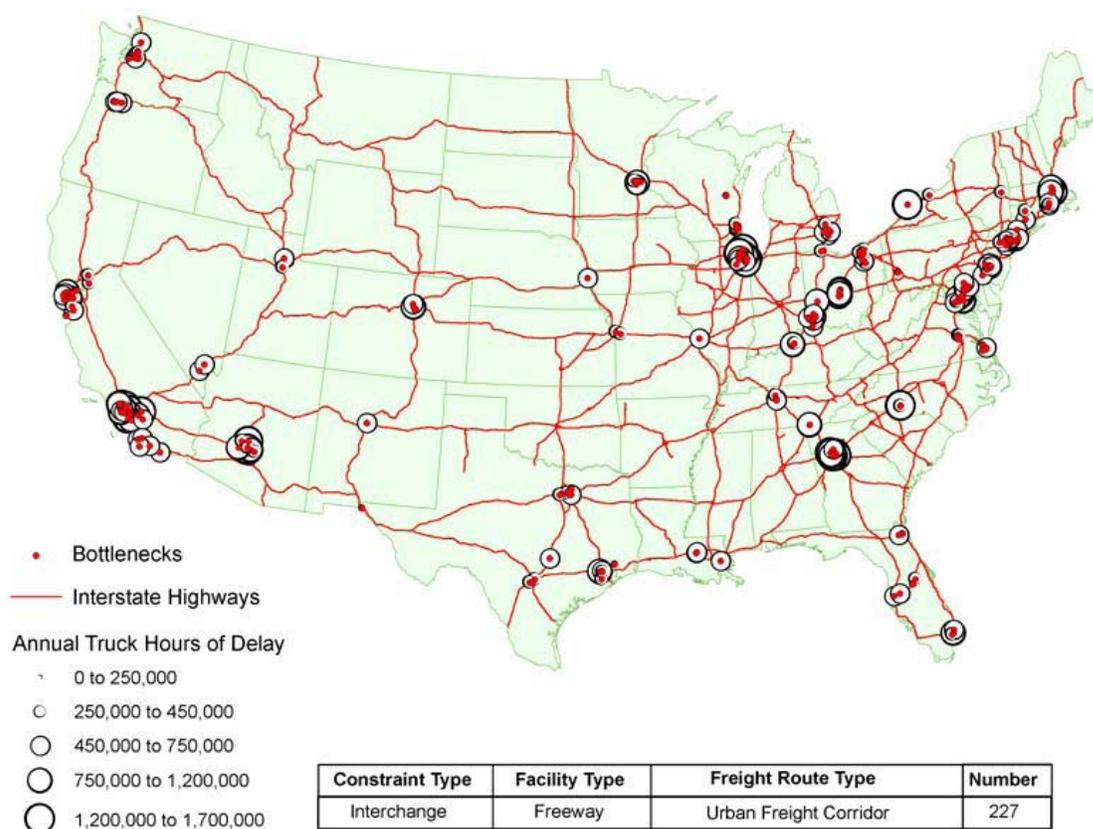


FIGURE 2-1 Freight bottlenecks at expressway interchanges (Cambridge Systematics 2005b).

nonrecurring congestion (congestion caused by crashes, breakdowns, weather, and construction, which accounts for 60 percent of the total]. The study estimates the direct user cost of recurring congestion delay of trucks to be \$7.8 billion annually. The map shows congestion concentrated in urban areas, and particularly in a few urbanized regions: the Northeast corridor, Southern California, and Chicago (Cambridge Systematics 2005b, ES-1–ES-4). This finding is consistent with the FHWA motor carrier travel time study results.

In summary, growth in highway traffic volume at a rate higher than the rate of addition of capacity is not sustainable indefinitely. Eventually, congestion will severely curtail traffic growth if it is not relieved by demand management or capacity expansion. Also, because existing traffic control measures are of limited effectiveness and road users are not accountable for the delay costs they impose on others, it would be possible, through better management, to reduce delay costs greatly without reducing total benefits to travelers. However, highway congestion is not systematically measured, and therefore the scope and costs of the problem, and how system users are coping with it, are poorly understood. The census travel survey data and the FHWA truck travel time measurements do not appear to lend strong support to the

characterization of the congestion problem nationwide at present as a crisis, although the cost of congestion in certain metropolitan areas appears extremely high.

Rail Congestion

The economic significance of congestion in the freight rail system differs from that of highway congestion. The rail operator has an incentive to offer the quality of service that its customers are willing to pay for. Operational mistakes occur, and lack of competition in some freight markets can harm performance, but overall, the rail system can be expected to maintain the economically optimum balance between the value of speed and reliability to shippers and the cost to the carrier of providing the service. Highways do not maintain this balance because the market mechanism that regulates rail use does not function for highways, and nonmarket traffic management techniques do not work very well. Congestion costs on railroads can be reduced only by technological breakthroughs (including advances in management techniques) that allow a given service quality to be provided at lower cost or by reducing noneconomic barriers that add to costs and delay (e.g., conflicts between freight and passenger traffic).

Average train speed for Class I railroads is an available performance measure related to freight congestion. Average speed rose 30 percent from 1980, at the time that economic regulation of the railroads was curtailed, to 1992, then declined through 1999. The latter period was characterized by rapid traffic growth and rail service disruptions that followed the 1996 Union Pacific–Southern Pacific merger and the 1999 purchase and division of the Consolidated Railroad Corporation (Conrail) by the Norfolk Southern and CSX Railroads. Speeds increased during the 2000–2001 economic downturn but have declined again since (AAR 2007, 37, 38; TRB 2003, 61). The trend in speed reflects changes in the composition of freight traffic as well as changes in speed on services, but it suggests growing congestion during a period of steady traffic growth.

The rail service disruptions of 1997 and 1999 focused attention on the freight transportation system. Service was seriously degraded over large areas of the country for durations of several months. The *Freight Capacity* committee accepted the view that the disruptions were extraordinary events triggered by industry restructuring (TRB 2003, 63–65). In 2004, during the fall peak traffic season, the Southern California ports experienced severe congestion in part because rail capacity for distributing the arriving containers was strained (CBO 2005).

A few published studies have measured railroad system performance by analyzing samples of actual freight movements. A review of four such studies conducted between 1977 and 2006 found remarkably constant average trip times and reliabilities for similar categories of movements. The authors concluded that “despite continuing advances in technology for track, equipment, and control, the service provided to general merchandise freight has been relatively unchanged for more than 30 years” (Martland and Alpert 2007, 53).

The Surface Transportation Board (STB) commissioned a detailed review of railroad industry economic conditions, which was published in 2008. With regard to capacity and performance, the study concludes as follows (Laurits R. Christensen Associates 2008, ES-28):

[T]here currently do not appear to be global or networkwide rail capacity constraints. Rather, as often occurs in network industries, congestion at various points or corridors in railroad networks appears to be the major culprit in capacity-related performance issues over the last ten years. . . . These results [of the STB study] are consistent with the conclusion reached by a number of economic researchers that the railroad industry still has a considerable amount of overall excess capacity.

With regard to the trend in capacity, the study concludes as follows (Laurits R. Christensen Associates 2008, ES-30):

[R]ecent increases in railroad capital spending, combined with a relatively weak economy, indicate that any capacity tightness that may have existed at the beginning of this decade has likely loosened in recent years. Thus, with the caveat that congestion issues are likely to continue to exist at localized points and cause service performance issues, near-term systemwide railroad capacity constraints are not likely to be a major issue. Regarding the longer-term forecasts of capacity constraints, . . . it is our assessment that one must treat these forecasts of future capacity needs as tentative, at best, particularly given the current economic climate [in] the U.S.

Another frequently cited recent analysis of rail capacity, commissioned by the Association of American Railroads (AAR), concluded that \$148 billion (in 2007 dollars) of infrastructure investment will be required to accommodate projected freight traffic growth and maintain service on the railroads from 2007 to 2035 and that without this investment, 30 percent of the rail miles in the nation's major freight corridors would be operating above capacity by 2035, causing severe congestion (Cambridge Systematics 2007, ES-1–ES-2). The author of the STB-commissioned study compares his results with those of the AAR-commissioned study and concludes that the two are consistent with regard to the present state of capacity: although local capacity bottlenecks exist, nearly all major corridor mileage is operating below capacity. He cautions that the 30-year projections in the AAR-sponsored study are highly uncertain because of their sensitivity to assumptions about future economic activity, technology, plant location decisions, and availability of other transportation modes (Laurits R. Christensen Associates 2008, ES-28–ES-31).

Congestion at Ports and Other Intermodal Terminals and at Border Crossings

Traffic through ports and at border crossings rose dramatically with the growth of international trade over the past two decades. Congestion in port regions and at crossings has been one of the most visible indications of stresses on the freight system, and port interests have been prominent in public debates over freight infrastructure funding.

Port congestion can arise from shortages of berths for docking ships; cargo-handling equipment; space for handling and storing cargoes and containers at the port; or capacity on the regional access network of highways, rail lines, and terminals that handle cargo to and from the port. Access route congestion is exacerbated by conflicts between freight and passenger traffic.

As with other components of freight infrastructure, data that would give a systematic view of port congestion delays and costs are lacking.

The TRB *Freight Capacity* committee reviewed the available evidence of port congestion and concluded that “while growth of some categories of freight at certain ports has been remarkable, there is some evidence that the waterside facilities of the U.S. port system as a whole are at present not capacity constrained” (TRB 2003, 67). With regard to landside access capacity, the TRB committee cited only a 2000 congressionally commissioned USDOT study of roads connecting freight terminals, including ports, to the National Highway System (NHS), which found that data are insufficient to judge the adequacy of funding levels devoted to improving these roads (TRB 2003, 66).

Traffic trends at the Ports of Los Angeles and Long Beach, which together handle more than one-third of U.S. marine container traffic, illustrate the source of congestion problems. Container traffic at the two ports [measured in numbers of 20-foot container-equivalent units (TEUs) passing through the ports annually] grew 153 percent (9.7 percent per year) from 1991 to 2001 and 62 percent (8.4 percent per year) from 2001 to 2007. The volume was 15.7 million TEUs in 2007, compared with 3.8 million in 1991 (AAPA 2008).

In the 2004 fall peak season, congestion delays at Los Angeles–Long Beach were severe, and traffic was diverted to other ports. However, the disruptions have not recurred. By the next year, ports, shippers, and carriers had begun instituting operational changes to manage or avoid congestion, and by 2007 and 2008, traffic was declining at the ports as a result of general economic conditions.

The TRB *Freight Capacity* committee identified growing congestion at intermodal terminals as among the trends that have shaped industry concerns about freight system performance. Important intermodal nodes include the seaports and inland rail hubs where containers are transferred between railcars and trucks. Only fragmentary data are available on performance of intermodal terminals. Problems with intermodal operations at Chicago, the most important inland hub, are the topic of the case study on the CREATE project summarized in Chapter 3.

Data on the magnitude and costs of delays at land border crossings likewise are sparse. U.S. trade with its North American Free Trade Agreement partners Canada and Mexico grew at 6 percent annually from 2001 to 2007, reaching \$909 billion in 2007 (Gallagher and Cassidy 2008). USDOT’s most recent published measurements of delays are for 2001, before the 2001 terrorist attacks that occasioned greatly increased border security precautions. The average delay for trucks was less than 20 minutes at 11 of the 14 traffic flows observed (two directions at each of seven crossings), but variability of delay was large, with 5 percent of all trucks entering the United States waiting an hour or more (TTI and Battelle Memorial Institute 2002, v–vi).

More recently, the Ontario Chamber of Commerce has conducted shipper surveys and estimated costs of border delays. The Ontario report identifies infrastructure deficiencies as a source of delays but emphasizes administrative delays: “Numerous and complex regulations governing the Ontario–U.S. border is the top ranked border concern from a 2006 survey of Ontario Chamber of Commerce members” (Ontario Chamber of Commerce 2007, 19). The report claims that “at least 44 different Canadian and U.S. agencies have jurisdiction over border operations” (Ontario Chamber of Commerce 2007, 2) and identifies lack of cooperation between U.S. and Canadian agencies as a primary obstacle to improvement. It cites a Canadian government estimate that the cost of U.S. security measures to Canadian truck operators is C\$250 million to C\$500 million per year and a somewhat more speculative estimate that the total

added logistics cost to U.S. and Canadian businesses from border delays is C\$13.6 billion per year (Ontario Chamber of Commerce 2007, 10, 19).

Freight Rates and Freight Industry Productivity

Freight rates are an economic measure of freight system performance in a competitive market. If freight transportation productivity is improving, shippers in a competitive freight market will be able to buy better service (i.e., more reliable and faster transport) at a given price or pay a lower price for a given level of service. Conversely, if productivity is declining, rising carrier operating costs will cause rates to rise. Capacity constraints (which may be shortages of labor, equipment, or infrastructure) also will cause rates to rise. When capacity is tight, carriers have the opportunity to increase profits by raising rates. Railroads can increase margins when rail infrastructure begins to be congested; profits in these circumstances allow the railroads to recover their full costs and provide funds for replacement and expansion of infrastructure. Truck operators experience highway congestion as an increased cost, which nonetheless affects rates.

The TRB *Freight Capacity* committee summarized freight railroad rate and productivity trends through the 1990s. Constant-dollar average revenue per ton-mile fell nearly continuously from at least the 1950s until 2002 and more rapidly after 1980, when most economic regulation of railroads was ended. Constant-dollar average revenue in 2002 was one-third the level of 1960 (TRB 2003, 61–62; AAR 2007, 31). The report cautions that ton-miles is an imperfect measure of freight industry output and that trends in rail costs and average rates depend on changes in the mix of traffic among bulk commodities, containers, and other lines of business. Labor productivity (quality-adjusted output per worker hour) grew from 1980 to 1998 by 109 percent in the railroad industry compared with 19 percent in all U.S. business (TRB 2003, 74).

The trend of continuously falling average rates was interrupted after 2002, as constant-dollar average revenue per ton-mile rose 15 percent from 2002 to 2007 (AAR 2008, 31). The Producer Price Index for the rail transportation industry (which is adjusted for changes in the mix of outputs within the industry) indicates that constant-dollar rail freight rates rose 27 percent from 2002 to 2008 (BLS 2009). The industry probably took advantage of tight capacity to increase margins in this period, although a large share of the average rate increase is attributable to the price of fuel. Fuel expense rose from 9 percent of total industry operating expenses in 2002 to 21 percent in 2007, the result of a tripling in fuel price (AAR 2008, 61).

Revenue, output, and productivity data are less available for trucking than for railroads. USDOT estimates indicate that constant-dollar average expenses per mile for for-hire truck transportation declined 11 percent from 1990 to 2000 (FHWA 2002). Labor productivity in trucking increased 38 percent between 1980 and 1998, more slowly than in the rail industry but faster than in all U.S. business. The Producer Price Index for the truck transportation industry (BLS 2009), available only for 2003–2008, indicates that constant-dollar truck rates rose 5 percent during the period. Rising fuel prices would more than account for this increase.

Data are not available that would allow systematic examination of trends in port services charges or port productivity. By one measure of capital productivity, annual container movements per terminal acre, U.S. container port productivity appears low by international standards. If ports at which transshipment is not a major share of activity are compared, the major East Asian and European container ports were about 60 percent more productive by this measure than were U.S. ports in 2000 (Vickerman 2003). The difference was mostly attributable to longer operating hours at the foreign ports. Some U.S. ports have increased their hours of

operation, so this gap may be closing. A case study analysis of U.S. port finance and investment in the 1990s concluded that productivity was not improving and that most new terminals did not exhibit increased productivity compared with older facilities. Landside access bottlenecks did not appear to be the cause of stagnant productivity (Ricklefs 2000).

In summary, throughout most of the past 25 years, U.S. freight shippers have experienced declining constant-dollar rates and (judging from the physical performance data described in the preceding section) more or less constant service quality. From this aggregate, nationwide perspective, the available data on costs and performance do not reveal any critical deterioration in freight system performance. Severe congestion and service disruptions occur but for the most part have been episodic and localized. The trend of declining rates has been interrupted by the rise in fuel price of the past 5 years. The future course of the price of fuel will have fundamental influence on the form of development of freight transportation. Publicly provided infrastructure has not achieved productivity gains comparable with those of the freight carrier industries. Port productivity has been stagnant or growing slowly. Data described in the next section show that highway infrastructure productivity improvement also has been slow.

Trends in Investment and Capital Stock Versus Traffic Growth

The disparity between the rate of growth of highway traffic and the rate of growth of constant-dollar highway infrastructure capital expenditures is sometimes cited as evidence that increased spending is justified. From 1971 to 2004, annual constant-dollar highway capital expenditures increased by 50 percent while vehicle miles of travel (VMT) increased 150 percent (TRB 2006, 28). The TRB *Freight Capacity* committee noted that this comparison is not directly relevant to performance because a constant rate of investment can produce growth in the stock of infrastructure if assets have long lifetimes. A more meaningful question is whether the stock of infrastructure is growing along with traffic (TRB 2003, 52). Comparisons between travel growth and simple physical measures of system size (e.g., highway lane miles, as in Figure 2-2, or railroad track miles) also are inconclusive, because most types of capital improvements increase capacity although many do not increase lane miles. For example, improving highway pavement quality, straightening alignment, installing and upgrading signals, widening lanes, and reconstructing intersections all increase highway capacity. Similarly, rebuilding track to increase load-bearing capacity and upgrading signal and communications systems increase railroad capacity.

Both the Bureau of Economic Analysis (BEA) and FHWA have developed economic measures of the capital stock of highways, and BEA publishes a measure of railroad infrastructure capital stock. These measures are derived from data on all past capital expenditures for infrastructure and estimates of the rates of depreciation of facilities. A capital stock measure combines the stocks of different kinds of facilities in a single index of capacity by weighting each facility according to the cost of providing it (TRB 2006, 55–56). It is an imperfect measure of capacity, as any single index of a multidimensional characteristic must be, but it is more comprehensive than the lane mile or track mile measures.

Between 1990 and 2003, the BEA estimate of the net capital stock of highways and streets increased 27 percent (BEA 2007b, Tables 7.2A, 7.2B), somewhat slower than VMT increased in the period (35 percent) but nine times greater than the increase in lane miles. In other words, BEA estimates that governments are investing in highways faster than they are wearing out and that the stock of roads is therefore increasing.

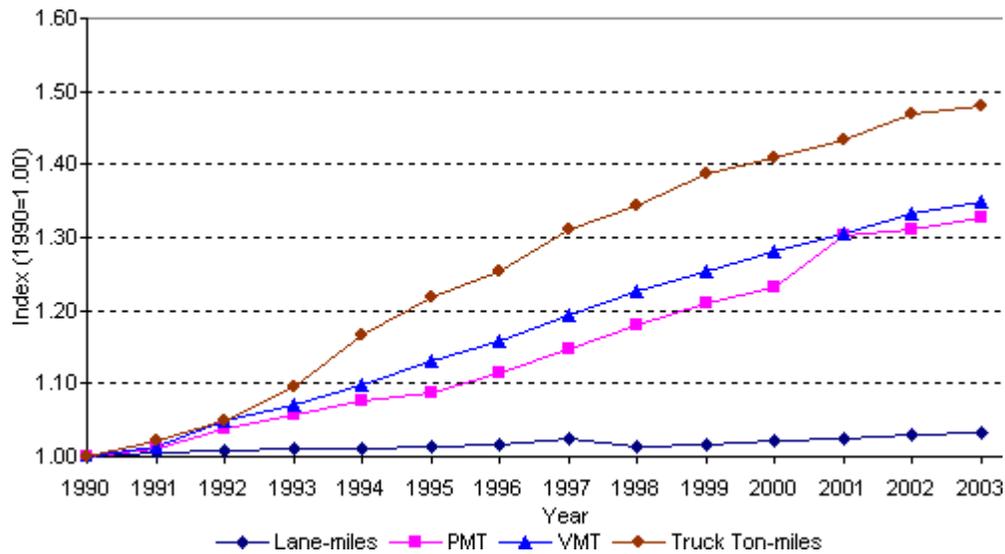


FIGURE 2-2 Growth of passenger miles traveled, vehicle miles traveled, truck ton-miles, and highway lane miles, 1990–2003 (VMT = annual vehicle miles of travel; PMT = annual passenger miles of travel). Source: FHWA n.d.

The TRB *Fuel Tax* committee pointed out that it is typical in the private sector for output to increase faster than the stock of infrastructure, as a result of productivity growth. It reported the following changes in capital–output ratios for highways, railroads, and another capital-intensive network industry, electric utilities, from 1959 to 1995:

<i>Industry and Ratio</i>	<i>Change (%)</i>
Highways [annual VMT/(productive capital stock)]	+16
Railroads [annual ton-miles/(structures net capital stock)]	+360
Electric utilities [annual electric energy consumption/(utility net capital stock)]	+200

The earlier TRB committee observed that, rather than examine why highway capital has not grown as fast as VMT, highway administrators might more constructively examine why productivity growth in the highway industry has been slower than growth in comparable industries (TRB 2006, 56). [The measure of highway infrastructure productivity above is not a measure of the productivity of the highway freight industry (i.e., the trucking industry).]

The increasing ratio of traffic volume to capital stock in the railroad industry and (to a lesser extent) in highway transportation does not demonstrate improved productivity if the cost of declining service quality because of rising congestion has offset the savings from higher capacity utilization. The data on rail congestion summarized above suggest that railroad service quality, for at least some kinds of freight, has been fairly constant in recent decades. Highway congestion has been worsening, so highway capital productivity may be declining.

Traffic Projections

An examination of aggregate traffic trends is relevant as an indication of the magnitude of the task of providing transportation services and infrastructure to sustain commerce in the coming decades. From 1995 to 2006, truck and rail traffic grew more slowly than did gross domestic product (GDP), air cargo somewhat faster, and port container traffic twice as fast (Table 2-2). Growth of truck and of port container traffic in the past decade was slower than in the preceding 20 years. These rates will not necessarily be sustained, but if continued until 2020 they would result in increases of 31 percent in truck and 47 percent in rail traffic, more than a doubling of air cargo, and a 140 percent increase in port container traffic.

A 2006 analysis of demographic and travel behavior patterns that influence VMT growth (Polzin 2006) projected that household VMT, which grew by 150 percent between 1977 and 2001, will grow by only 50 to 60 percent between 2001 and 2025, less than half the historical annual rate, because of slower growth in population, in annual trips per person, and in other factors. The analysis does not consider fuel price explicitly. The results of other research suggest that even large increases in fuel prices might not have a major impact on household VMT, because motorists mainly accommodate higher fuel prices by buying more fuel-efficient vehicles rather than by reducing the amount they travel (Small and Van Dender 2007, 17).

The most recent published comprehensive freight traffic forecasts are those of the U.S. Department of Energy (DOE) in its *Annual Energy Outlook*. DOE's Reference Case projections are for a 22 percent increase in truck VMT from 2007 to 2020 (1.6 percent per year) and an 11 percent increase in rail ton-miles in the same period (0.8 percent per year) (EIA 2008). Both projections are for much slower growth than historically: from 1990 to 2006, annual growth rates were 2.6 percent for truck VMT and 3.4 percent for rail ton-miles. The projections assume high and rising energy prices over the period [petroleum at \$116 per barrel (in 2007 dollars) in 2020] and moderate GDP growth.

TABLE 2-2 Trends in U.S. Domestic Freight Traffic

	1975	1985	1995	2006	Growth (%/year)		Projected Growth, 2006 to 2020, at 1995–2006 Rate (%)
					1995–2006	1975–1995	
Combination truck vehicle miles (billions)	47	77	115	143	1.9	4.6	31
Rail ton-miles (billions)	754	877	1,306	1,772	2.8	2.8	47
Port container TEUs (millions)		11.7	22.3	44.4	6.4	6.7 ^a	140
Air cargo ton-miles, U.S. carriers (billions)			23.2	39.7	5.0 ^b		98
GDP (\$2000 trillions)	4.3	6.1	8.0	11.3	3.2	3.2	56

^a 1985–1995.

^b Changes in reporting requirements may have affected apparent growth.

SOURCES: AAR 2007, 27; FHWA 2008, Table VM-1; AAPA 2007; BEA 2007a, Table 2A; FAA 2000, Tables 17 and 18; FAA 2007, Table 19.

It was noted above that the growth of imports of containerized merchandise from Asia through the Southern California Ports of Los Angeles and Long Beach over the past 15 years strongly influenced perceptions of freight transportation investment needs. Accommodating the growth required expansion of the ports, major improvements in port access in the Los Angeles metropolitan area, and expansion of the transcontinental capacity of the railroads, which distribute a major share of the goods nationwide. From 1994 to 2006, container traffic through the two ports more than tripled, from 5.1 million to 15.8 million TEUs per year. In the same period, container traffic increased 136 percent at all West Coast U.S. ports and 117 percent at all U.S. ports (AAPA 2008). The growth in port container volumes closely parallels the growth in the value of total U.S. imports of goods in the period (Figure 2-3). Container transport capacity requirements are essentially determined by the containerized import volume, since imports exceed exports and containers must be returned whether loaded or empty.

There are grounds for expecting that the historical rates and patterns of trade growth of recent decades will not continue unaltered. Some import merchandise traffic is diverting from Southern California to less congested West Coast and East Coast ports, and railroads are adjusting their expansion plans accordingly (Boyd 2008; Mongelluzzo 2008). Growth in the total volume of merchandise imports will at some point begin to moderate as domestic markets for particular categories of goods become saturated. It is generally recognized that the present level of the U.S. trade deficit is not sustainable because the deficit is causing U.S. debt to rise faster than income; the eventual correction will involve a decline in imports and a rise in exports (CBO 2007, 1–3). Goods make up a smaller share of U.S. exports than of imports and some growth in goods exports can be accommodated with existing landside capacity, so the adjustment will tend to relieve pressure on freight infrastructure serving international trade. Growth in U.S. exports of noncontainerized bulk commodities (e.g., coal and grain) would eventually necessitate land transport capacity expansion.

Summary: Performance Trends

The TRB *Freight Capacity* committee characterized the past performance of the freight transportation system as follows (TRB 2003, 15):

The history of freight transportation in the United States has been one of nearly continuous, often dramatic, productivity improvement. The performance of the freight transportation sector has been instrumental in allowing the United States to become the world's largest integrated market and to participate successfully in global trade. The sector has in this way advanced economic welfare, and interruption of the historical trend of productivity improvement would be a substantial loss.

The updated trends summarized in this section do not reveal any fundamental reversal in this historical performance record. Providers of freight infrastructure and services recently have shown adaptability in responding to pronounced shifts in the patterns of demand caused by international trade growth and to disruptive swings in fuel prices.

Freight system users (and passengers, on facilities shared by passengers and freight) do not pay all the costs of the services they receive; therefore, performance of the system from the standpoint of users is not a complete test. The fees and special taxes that truck operators and port and waterway users pay do not fully cover the cost to the government of providing

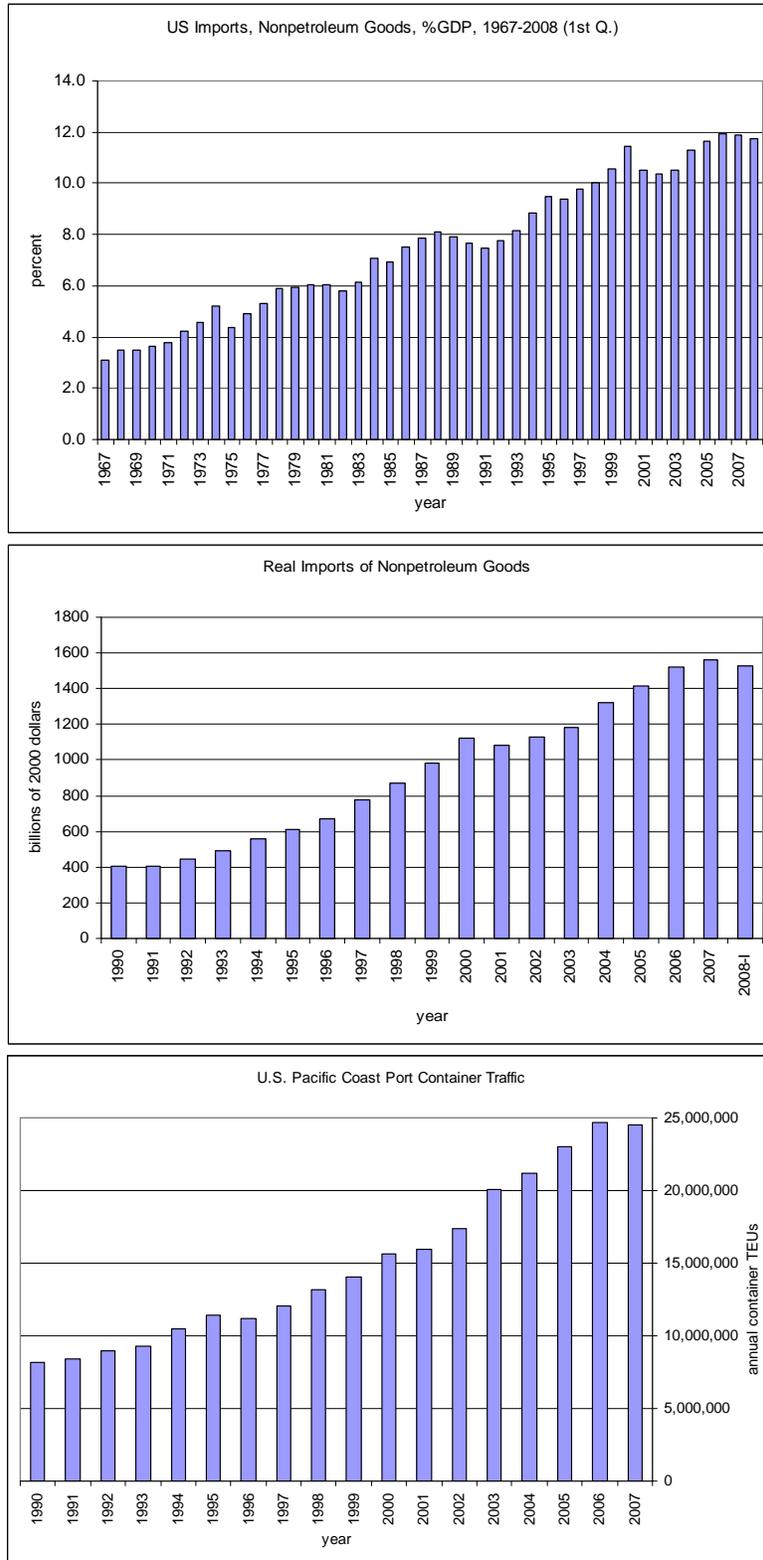


FIGURE 2-3 Selected U.S. goods import trends: (top) U.S. imports of nonpetroleum goods as percentage of GDP, 1967–2008 (first quarter) (BEA 2008, Tables 1.1.5, 4.2.5, 4.2.6); (middle) real imports of nonpetroleum goods (BEA 2008, Tables 1.1.5, 4.2.5, 4.2.6); (bottom) U.S. Pacific Coast port container traffic (AAPA 2008).

infrastructure for them. In part because fees for public infrastructure do not fully reflect costs, excessive congestion hampers operations at certain major nodes of the freight system. The economic benefit of relieving these bottlenecks probably would be substantial. Also, all the freight modes have environmental costs for which their users are not responsible. Cost-effective regulations or other measures to reduce these costs would improve freight system performance from the standpoint of the public as a whole.

In the past 40 years the industry has benefited from a series of major stimuli to productivity growth: the construction of the major part of the Interstate highway system in the 1960s and 1970s, economic deregulation in the late 1970s, and applications of information technology to improve resource utilization from the 1980s to the present. New breakthroughs will be needed if the industry is to match its historical record in the future. Along with the entire economy, the industry faces great uncertainty over the next decade with regard to energy prices, environmental regulation, and change in patterns of trade and consumption. Finance reforms that promoted efficient investment and operations could make an important contribution to maintaining industry performance in this period.

RELATION OF FINANCE TO PERFORMANCE

Finance arrangements in public infrastructure programs affect project selection decisions, the distribution of costs and benefits, and the operating efficiency of facilities. For example, the decision of Congress in the Federal-Aid Highway Act of 1956 to fund the federal highway program through dedicated revenue from taxes on users has influenced the development of the highway system (TRB 2006, 80–81). If instead Congress had decided to fund the program from general revenue or from tolls, the evolution and performance of the system probably would have differed greatly from those of the highway system as it actually has developed. Any new government programs to build or pay for infrastructure should be designed with the connection between finance arrangements and outcomes in mind.

The choice among funding from user charges (e.g., the tolls on a toll road or the charges a railroad collects from its customers); from a special tax related in some way to use, like the motor fuel taxes paid into federal and state highway trust funds; or from other public revenue (general tax revenue or other broad-based taxes) is the most consequential decision in designing the finance arrangements of such programs. When construction and operation of a facility must be covered by revenue from fees charged to users, only facilities for which there is a strong expectation of sufficient revenue will be built. If a facility is built and operated with user charge revenue, benefits to users are certain to exceed its construction and operating costs. From the perspective of national economic well-being, the important benefits of a freight infrastructure improvement are the reduced cost of transporting the freight that traverses the improved facility; therefore, when user charges are relied upon, the risk of poor investments in low-value facilities is reduced.

Reliance on user charges does not guarantee optimum investment. In some circumstances, a worthwhile facility cannot be fully funded by such charges; an example is a toll road that must compete with an untolled parallel route. In addition, when the provider of infrastructure is a public or private monopoly, user charge funding does not guarantee that the provider will build facilities of the design and scale that would be most beneficial to users. Nonetheless, compared with the alternative of funding from general tax revenue (for either

publicly provided facilities or subsidies to private-sector providers), user charge funding of freight facilities is likely to lead to more disciplined investment decisions and therefore to a higher return on the investment program.

In addition to influencing which facilities are built, the choice between user charges and general revenue funding affects the efficiency of use of existing facilities. If charges are related to the cost of serving each individual user, then users for whom the value of the service is less than the cost of providing it are priced off the facility. If congestion charging is employed, peak usage can be regulated so as to maximize the total economic benefit that the facility yields.

The TRB *Fuel Tax* committee, in its examination of problems of applying road pricing, warned of the risk of poorly designed charges: “user fees can be harmful if the charges that travelers incur for many trips exceed the added cost to the public of providing those trips. User fees can promote efficient use of facilities if they bear at least a degree of correspondence to the public’s costs of providing the facilities. Then users will make decisions . . . that take these costs into account. Fees set too low allow wasteful use of facilities, and fees set too high needlessly discourage travel” (TRB 2006, 85). The committee observed that local governments controlling road pricing might conceivably attempt to divert undesirable traffic to neighboring communities by high charges or, alternatively, might depress charges below costs to subsidize favored users. It concluded that “because of inexperience, highway agencies do not now have the competence to set mileage fees that maximize the benefits of the transportation system or to use the information provided by fee revenues to improve the payoffs from capacity expansions. Improper pricing practices could degrade system performance and harm the public welfare” (TRB 2006, 148). The committee recommended a program to develop the necessary competencies. The *Fuel Tax* report addressed charging for roads, but similar concerns may be justified with regard to charges at other government-operated facilities, such as ports.

As the previous section described, past TRB committees concluded that public transportation infrastructure programs today are characterized by poor targeting of investments to the highest-payoff projects and by inefficient use of existing facilities. The two subsections below review evidence on the efficiency of operating practices and investment targeting. As noted in the introduction to this chapter, the available evidence is fragmentary.

Operating Efficiency

Most publicly provided transportation facilities, including roads, the inland waterways, and airways and airports, experience excessive levels of congestion. That is, with better management of use, many of these facilities could carry more traffic than they do today with lower total operating and time delay costs, and the investment required to serve traffic growth would be reduced. The most effective means of managing use in the public interest would be through pricing.

The problem of inefficient levels of congestion is much less severe on the private-sector components of the freight transportation system. From the point of view of the owners of private infrastructure, most congestion costs are internal; that is, the owners have an economic incentive to manage these costs efficiently. (An exception is the road congestion caused by rail traffic at grade crossings.)

USDOT submits biennial reports to Congress that project the effects of alternative levels of highway capital spending (for all levels of government) on highway performance and highway user costs (travel time, vehicle operating costs, and accident costs). The 2006 study, with

projections for the period 2005–2024, for the first time includes an estimate of how road congestion pricing would alter the benefits of increased highway capital expenditures. For a scenario that assumed application of optimal congestion pricing on all congested roads, USDOT estimated that the annual capital cost to maintain present physical and operating conditions on the highway system over the forecast period would be reduced by \$22 billion per year (from \$79 billion to \$57 billion in 2004 dollars). The road charges would cause some users to give up or alter some trips, but this loss would be offset by higher travel speeds for other users, and the net user benefit of the roads would not decrease. USDOT notes that this estimate represents an upper bound on potential savings, because of the practical difficulties (at least currently) of pricing, but nonetheless indicates the great cost of present inefficient road operating practices (USDOT 2007, 10-3–10-6).

The USDOT report does not estimate how congestion charging would affect travel volume or average speeds, but the practice would avoid gridlock conditions and increase off-peak utilization of capacity. Charging reduces the investment required to maintain the present level of service by increasing effective capacity on existing roads and by eliminating some trips that are worth less to the traveler than the cost they impose on the road authority and other users.

Excessive congestion is not the only inefficiency in road operation that could be ameliorated by better pricing. Opportunities exist for considerable economies in the management and regulation of truck traffic on highways. Roughly 80 percent of all U.S. freight transportation expenditures are for trucking services; therefore, incremental improvements in trucking industry efficiency have high value. USDOT and TRB studies have concluded that changes in truck fees accompanied by changes in highway agencies' pavement and bridge management could reduce the infrastructure cost of truck traffic, reduce average vehicle operating costs per ton-mile, and at the same time eliminate the implicit subsidy that some trucks probably are receiving because road user taxes they pay do not cover the cost of providing roads for them. This subsidy biases competition among trucks, railroads, and waterways. The fee changes would be designed to align payments more closely with the highway agency's cost for serving individual trucks, which depends on design and weight of the truck, its mileage, and the roads used. The new fees would give truck operators an incentive to consider highway costs in selecting operating practices and truck designs. Estimates of potential net savings are on the order of several percent of annual truck transportation expenditures (TRB 2003, 47–80; TRB 2006, 67–68).

The users of the inland waterway system (particularly users of the locks on the upper Mississippi River) and of the air traffic control system also bear needlessly high costs from congestion delay, and the effective capacity of these systems is reduced, on account of inefficient demand management. On neither system are users charged directly (although both systems are funded in part through dedicated user tax revenues). User charges would provide a practical and effective means of managing demand so as to increase the public benefit derived from these systems. The revenue would be a source of funding for operations and capital improvements (TRB 2003, 42–43, 85–89; TRB 1991, 231).

Investment Decisions

The *Fuel Tax* and *Freight Capacity* committees identified weaknesses in investment decision making in the public sector—especially dissipation of available funds on projects with low returns—as a fault of present transportation infrastructure finance arrangements that could be

repaired by reforms (TRB 2006, 186–187; TRB 2003, 112). Both committees concluded that getting higher public returns on investments of available funds will be essential in improving transportation system performance.

The states and the federal government have long recognized the need for improved capital programming, and governments have promulgated rules and guidelines calling for adoption of rational evaluation methods (OMB 1997; Neumann 1997). However, the investment decision-making problem is not simply one of inadequate planning techniques in public agencies. Government capital investment decisions are inevitably more difficult than decisions in the private sector. Private-sector decisions are guided by markets; that is, revenue and cost data provide managers with information about which facilities and lines of business are most likely to generate profit if expanded, and firms that make consistently poor investment decisions cease to operate. In the public sector, for facilities that are paid for with tax revenue, no such direct feedback from consumers guides decisions. Public officials may rely to some extent on formal analyses of costs and benefits but for the most part are guided by officials' judgments regarding constituents' preferences and equity impacts (TRB 2003, 39).

The two earlier TRB committees also concluded that public-sector capabilities for evaluating transportation investments are deficient. On account of the lack of evaluation, it is impossible to measure the extent of misallocation of public capital expenditures (with respect to the allocation that would yield the greatest return). The *Freight Capacity* committee reviewed case studies of decision making on freight projects and capital programs for intercity highways, a multimodal corridor proposal, inland waterways, and port access improvements. It found that decisions consistently were made without good estimates of benefits or systematic exploration of alternatives, were sometimes inconsistent with the economic information that was available, and sometimes appeared to be biased in favor of capital-intensive solutions over operational improvements (TRB 2003, 113–117, 137–138). The committee also concluded that government research and development spending (a form of capital investment) has not established a record of success in developing and fostering implementation of new transportation system technologies (TRB 2003, 40–41).

The three subsections below review the limited available information on the quality of public transportation investment decisions for highways and other modes and the question of antifreight bias in public-sector investment decisions. The observation that public-sector projects sometimes have low returns is relevant to the committee's study in two respects. First, any new federal or state freight infrastructure programs should be designed to maximize economic returns on investments. Therefore, it will be necessary to understand the sources of poor investment decisions and to provide for avoiding these risks in future programs. It was argued above that the surest way to avoid investing in low-return projects is to require project-level funding by means of user charge revenue; that is, finance arrangements will influence how well investment dollars in any new program are spent.

Second, the incidence of projects with low return (or of projects motivated by considerations other than national economic benefits) provides a test of the merits of proposals to increase investment in freight infrastructure with public funding. If infrastructure is underfunded, then a backlog of projects for which users would willingly pay should exist, once institutional obstacles to finance and construction were removed. Instead, in several of the most prominent freight projects and proposals of recent years (including some of the case studies described in Chapter 3), it is acknowledged that users would not be willing to pay the full costs. If underfunding is a crisis, as asserted by several observers cited at the beginning of this chapter,

then it should not be difficult to find examples of a backlog of projects with very high returns, and such projects should be crowding out most low-return projects.

The data are insufficient to allow the committee to judge the size of the backlog of high-return projects. However, it would be prudent to verify the existence of a backlog before enacting new spending programs.

In this section, as throughout this report, references to economic benefits or to returns on investment are meant to encompass both market and nonmarket benefits. The market benefits of a project that improves freight infrastructure include reduced prices of goods and services resulting from lower transportation costs. Nonmarket benefits may include reduced pollution and congestion costs of freight transportation.

Highway Investments

The TRB *Fuel Tax* committee reviewed evidence of the return earned by U.S. highway investments in recent decades, including USDOT's biennial reports to Congress on the conditions and performance of the U.S. highway system, and four econometric studies from the academic research literature (TRB 2006, 68–73).

The USDOT conditions and performance reports are derived from a sample database of U.S. road conditions and a model of benefits and costs of road improvement projects. The 2006 report's (USDOT 2007) projections (similar to those in the earlier report reviewed by the 2003 TRB committee), for the period 2004–2024, indicate that if all highway capital projects nationwide with a benefit–cost ratio greater than 1 were carried out, annual capital spending over the period would average 87 percent higher than actual 2004 spending. Most of the incremental benefit of this optimal program probably could be attained with a much smaller increment in spending (CBO 1998, 21). The 2006 USDOT study did not report rates of return. However, the 2000 study reported that if all projects with benefit–cost ratio greater than 1 were carried out over the 20-year period 1998–2017, the average benefit–cost ratio would be 3.7 (USDOT 2000). The USDOT studies thus indicate that the direct benefits to highway users of additional capital spending for highway system preservation and expansion would exceed the cost to the government and that spending would have to expand to a level substantially greater than present spending before highway agencies ran out of worthwhile projects, provided that projects are carried out in the order of the benefit–cost ratios.

The *Fuel Tax* committee concluded that the evidence, although highly incomplete, indicates that the nation has earned a positive return on the investment in the highway system, that historical annual expenditure levels have been justified by the incremental benefits received, and that the highway finance system—in particular, reliance on user fees as the primary source of funds—has contributed to this success. The fees act (imperfectly) as prices, discouraging low-value trips, and the constraint of dependence on revenue generated from users reduces the risk that overall spending will exceed economically justified limits. The committee also concluded, however, that the highway finance system does not provide a strong internal check that individual projects are economically justified (as would a system under which more projects had to rely on funds they generated themselves through tolls) (TRB 2006, 185–186).

The *Fuel Tax* committee noted that each of the economic research studies reviewed measured a decline over time in the benefits of incremental investment in the highway system (although the timing of the decline was inconsistent among the studies). The studies reported estimates of the effects of past increases in the supply of highways on truck transportation costs,

inventory holding costs, and productivity in individual industry sectors (TRB 2006, 204–207). Two of the studies concluded that the most recent incremental investments were earning returns below the opportunity cost of the funds invested. With regard to the cause of the apparent downward trend in returns, the authors of one of the studies speculated as follows: “It is also possible that inefficient highway pricing and investment policies have undermined the benefits from government spending. The inefficiencies associated with such policies include but are not limited to wasteful pork barrel spending, poor responses to demographic changes, and suboptimal maintenance of the road system. . . . [L]engthy delays and large cost overruns . . . have postponed service improvements and lowered returns” (Shirley and Winston 2004, 212–213). In addition, the period analyzed included the initial construction of the Interstate system, the first completed components of which produced large returns, while successive incremental expansions would be expected to yield declining returns. However, declining returns on transportation investments is by no means inevitable. In a healthy, growing industry, technological progress and changing patterns of demand (as population and economic activity grow and relocate and consumers’ preferences for transportation services evolve) should continually create new opportunities for high-return investment.

Unusual insight into the capital programming practices of a state highway program was provided by a 2007 performance audit of congestion management and reduction efforts of the Washington State Department of Transportation (WSDOT) in the Seattle region, conducted at the direction of the state legislature. The audit concluded that, although WSDOT is a national leader in measurement of congestion and in applying congestion management techniques, the goal of congestion reduction plays no explicit role in the state’s capital programming practices. Agency priorities direct investment toward physical preservation of the system, and programming aims to minimize agency costs rather than the sum of agency and user costs. Analysis of congestion impacts usually is not performed until after projects are selected. The audit recommended that the legislature require WSDOT, in forming its program, to project congestion impacts of projects and to evaluate impacts in terms of hours of delay avoided per dollar spent (Sonntag 2007, 51, 55–58). A review of bridge improvement programming in three states (Marshall et al. 2000) lends support to similar conclusions: that states may be overlooking lower-cost alternatives to capital expenditures (i.e., they tend to favor replacement over repair) and that they tend to give greater weight to agency costs than to user costs in planning construction programs.

The findings of the Washington audit report are consistent with the conclusions of a GAO survey of state highway agencies that asked what factors agencies considered in forming their capital programs. The survey responses indicated that formal analysis comparing benefits with costs plays almost no role in investment decisions. Among 10 projects whose files were examined in detail, GAO found none for which a benefit–cost analysis had been completed. Expected safety and environmental impacts of projects often were quantified, but other benefits were rarely if ever quantified. Evaluation of the outcomes of completed projects appeared to be rare, and often data on costs and usage that would be needed for such evaluations were not available (GAO 2005, 23–36).

A 1998 Congressional Budget Office (CBO) report examined specifically the evidence on the economic effects of federal capital programs, including the federal-aid highway program (CBO 1998). The review of infrastructure programs was updated in 2008 (CBO 2008). For its analysis, CBO reviewed economic studies of returns to public investment and data provided by FHWA and the Federal Aviation Administration. CBO concluded that “many federal investment

projects yield economic benefits that are small, or even negative. Others yield high returns that would be forgone in the absence of federal involvement, but the number of such projects appears to be limited. . . . Increases in federal investment spending that are not targeted toward cost-beneficial projects can reduce growth” (CBO 2008, 2).

Low-return projects are common because the award of federal grants is influenced by goals other than maximizing national income. The goals often are primarily distributional: either to aid particular groups or regions or to ensure that all regions receive proportional shares of funds regardless of the relative merits of local projects. These may be legitimate federal policy goals, but the weight that they are given in the direction of federal investment programs reduces the effectiveness of these programs as means of promoting economic growth because federally directed investment will not flow to the projects with the highest economic returns.

CBO points out that the net benefit of federal investments funded by general taxes is reduced as a consequence of the structure of federal taxes. The federal tax system distorts relative prices in the private sector and thus reduces economic efficiency. CBO cites estimates that the opportunity cost of an extra dollar of federal tax revenue is on the order of \$1.20 to \$1.60 (CBO 1998, 13).

Investments in Other Modes

Reviews by National Research Council (NRC) committees and by GAO of U.S. Army Corps of Engineers evaluations of its civil works projects, including improvements to the inland waterways and harbor channels, have reached similar conclusions. A GAO review of Corps of Engineers projects and actions (including one transportation project, the Delaware River channel-deepening project, which is described in Chapter 3) found that “generally, . . . the Corps’ studies understated costs and overstated benefits, and therefore did not provide a reasonable basis for decision-making” (Mittal 2006, Highlights page). For the Delaware River project, GAO found that most of the projected benefits lacked substantiation.

The NRC review of planning for reconstruction of the locks on the upper Mississippi River (NRC 2001) similarly concluded that the planning for the project probably overestimated benefits. More problematic, in the NRC committee’s view, was the superficial consideration given to noncapital alternatives, that is, demand management to reduce congestion costs. The committee also noted that no consideration had been given to the consequences of alternative stagings of improvements (e.g., delaying some or all improvements until a portion of projected traffic growth had materialized). When traffic projections are highly uncertain and the contemplated capital improvements have high cost and long life, delaying construction can be a prudent means of reducing the risk of the project.

Federal Aviation Administration data on projected costs and benefits of 18 airport improvement projects were reviewed by CBO (CBO 1998, 20–21). CBO cautions that the sample cannot be taken as representative, but the data illustrate how variable returns may be in a single program. The benefit–cost ratio was less than 1 for four of the projects, while for three the ratio exceeded 10.

The absence of credible evaluations of benefits of a project does not demonstrate that the benefits are in fact small. However, without evaluation, success in targeting investment funds to the highest-return projects will be unlikely.

The Question of Antifreight Bias in Capital Programs

A frequent complaint of freight industry participants concerning public investment priorities is that transportation agency decisions are biased in favor of passengers over freight (USDOT 2000, 5). Much evidence points to poor public–private coordination in identifying and designing projects that would have freight mobility benefits, including the case studies in Chapter 3 of this report and the case studies and industry interviews conducted by the *Freight Capacity* committee (TRB 2003, 116–118). The 2005 survey of shippers, carriers, and government officials by the MIT Center for Transportation and Logistics found little public–private collaboration on freight matters and divergent perceptions of the root causes of congestion—officials citing insufficient infrastructure investment and private respondents citing primarily operational issues (Caplice and Blanco 2006, 5). Nonetheless, the *Freight Capacity* committee was unable to verify the claim of antifreight bias in programming because the project evaluations and alternatives analyses needed to reveal any bias have never been carried out (TRB 2003, 65–66, 116–117). The committee noted that its case studies demonstrate that major bottlenecks are simultaneously freight and passenger mobility problems.

USDOT's 2000 study of roads that serve as intermodal freight connectors and are not part of the NHS reached a similar conclusion: that because states do not systematically evaluate the freight or passenger user costs and benefits of alternative road improvements, it is not possible to judge whether higher spending on these roads would be justifiable. USDOT found that average capital spending per mile on the connector roads was greater than spending on comparable NHS roads of the same classes, although much of the reported spending was concentrated on a small percentage of the connector routes (USDOT 2000, 5, 26, 32).

The weaknesses of capital programming practices are more fundamental than a bias in favor of passengers over freight. The complaints of freight industry participants about poor communication with government officials on investment priorities, the lack of information about congestion available to transportation agencies, and the observations that investment decisions often do not take into account congestion and other user cost impacts together suggest a more general inefficiency in public transportation programs: that administrators are not proficient in allocating funds to the projects that would yield the greatest user benefits or in budgeting between capital and maintenance expenditures.

SUMMARY

Government and industry observers have described the primary challenge facing present transportation finance arrangements as a funding gap: that the current rate of investment in capacity is inadequate to accommodate expected future traffic. In this view, the necessary response is an increase in public-sector capital spending, which may be drawn from general tax revenue, special user taxes, or user charges.

However, freight transportation system performance, especially on the publicly owned parts of the infrastructure—roads, waterways, and airports and airways—is hindered by operating practices that lead to needlessly high congestion costs and by investment decision making that often directs capital spending according to noneconomic factors. Considerations related to the distribution of funds and project benefits among regions and constituencies will inevitably influence public-sector investment choices; nonetheless, this multiplicity of objectives

weakens the effectiveness of public spending programs for promoting economic growth because available funds are not concentrated on the capital projects that would yield the highest returns.

Efforts to maintain freight system performance and expand freight infrastructure in the future will confront social, economic, and institutional challenges, regardless of the level of funding. The costs of building infrastructure will continue to rise because of increasing population density and competition for uses of land and because of the greater value placed on environmental quality. Also, in many parts of the country, regional institutions lack capabilities for carrying out complex multimodal infrastructure projects.

The ability of the managers of public infrastructure to identify investment priorities is hindered by lack of information. Public debate over transportation policy is similarly hampered. No nationwide systematic measurement of the performance of public infrastructure is conducted. Commonly cited measures of physical performance (i.e., trends in congestion and capacity) are of unknown validity, and no effort is made to measure economic performance of public infrastructure (i.e., in terms of productivity trends and return on investment). Public investment proposals are rarely subject to credible quantitative economic evaluation. Outcomes of completed projects are almost never evaluated. The lack of information makes poor investment decisions unavoidable.

Correcting the failings of operations management and investment targeting in public infrastructure programs would improve current performance and increase the cost-effectiveness of future investments in maintaining or improving performance. Conversely, major new spending programs that tolerated these failings would be ineffectual. The failings are linked to the present finance arrangements for public transportation infrastructure. When users of facilities are not responsible for the cost of providing service to them, accountability for investment decisions is weak. Furthermore, when facility use charges are not in place, pricing, the most effective tool for optimizing facility performance, is not available.

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Abbreviations

AAPA	American Association of Port Authorities
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
BEA	Bureau of Economic Analysis
BLS	Bureau of Labor Statistics
CBO	Congressional Budget Office
ECMT	European Conference of Ministers of Transport
EIA	Energy Information Administration
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GAO	General Accounting Office; Government Accountability Office
NRC	National Research Council
OECD	Organisation for Economic Co-operation and Development
OMB	Office of Management and Budget
TRB	Transportation Research Board
TTI	Texas Transportation Institute
USDOT	U.S. Department of Transportation

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Freight Transportation Infrastructure Finance Practices Today

This chapter describes present freight transportation infrastructure finance arrangements, with illustrations from case studies of freight projects. An understanding of present practice is necessary as a basis for evaluating the finance reform proposals that are described in Chapter 5. The first section below summarizes capital expenditures in the U.S. freight transportation system and public and private roles in providing facilities and services. The second section describes finance arrangements for public infrastructure. The final section describes the eight case study projects. The committee commissioned resource papers to document these cases, concentrating on the finance arrangements in each project, the nature of the intended benefits, and the responsible institutions. To supplement the case studies and provide a broader view of finance arrangements, the committee compiled summary information on 30 additional recent or planned freight projects. The final section also presents observations from the projects examined with regard to the adequacy of present finance arrangements. The annexes to the chapter present tabular summaries of the case studies and the additional projects examined.

SPENDING FOR FREIGHT INFRASTRUCTURE

Public and private capital expenditures for highway, freight rail, aviation, and water transportation infrastructure in the United States were \$90 billion in 2004 (Table 3-1), equal to 6 percent of total 2004 government and private nonresidential gross domestic investment in structures and equipment (BEA 2007). Most highways and aviation facilities serve passenger as well as freight traffic. As noted in Chapter 1, there is no unambiguous way to allocate cost responsibilities between passengers and freight on these systems. Highway agencies receive 20 to 25 percent of highway user tax revenue (motor fuel taxes and registration and permit fees) from operators of large trucks (FHWA 2007, Tables FE-9, MF-2, MF-121T, MV-2, HF-10), and requirements for accommodating truck traffic have a major impact on the cost of providing highways. About 20 percent of U.S. air carrier revenue is derived from air cargo (Air Transport Association 2009, Air Cargo World Online 2006), but requirements for passenger service largely dictate the design and scope of the air transport system.

As Table 3-1 indicates, government provides the highway and inland waterway systems and most elements of aviation and port and harbor infrastructure. Government expenditures are 91 percent of the total in Table 3-1. Private-sector firms provide freight rail infrastructure; terminals for highway, water, and air cargo transport; and most vehicles and equipment. Private-sector business expenditures for transportation equipment (excluding automobiles and light trucks) were \$56.5 billion in 2004 (Table 3-2), most for freight-carrying equipment (although aircraft expenditures are primarily for passenger service). Governments operate the facilities they build. The private sector provides all freight transportation services to shippers, with the exception of the U.S. Postal Service.

**TABLE 3-1 Capital Expenditures for Freight Transportation Infrastructure, 2004
(\$ billions)**

	Public			Private	Total
	Federal	State and Local	Total		
Highways	30.2	36.5	66.7	n.a.	66.7
Freight railroads	0	0	0	6.4	6.4
Aviation	5.6	6.8	12.4	2.0	14.4
Ports, harbors, and inland waterways	0.7	1.7	2.4	0.1	2.5
Total	36.5	45.0	81.5	8.5	90.0

NOTE: Highways and aviation facilities serve passengers as well as freight; water and freight rail serve minor amounts of passenger traffic. Passenger rail and transit 2004 infrastructure capital expenditures (not included in the table) were \$16.2 billion.

Although CBO reports no public expenditures for freight rail infrastructure in 2004, the states and the federal government from time to time have awarded grants for this purpose. Also not included in the table are \$0.4 billion trucking industry and \$3.8 billion pipeline industry expenditures for structures in 2004 (BEA 2007, Table 3.7S).

Waterways expenditures may exclude certain navigation-related expenditures of the U.S. Army Corps of Engineers.

Nearly all federal spending for highway infrastructure is through grants to state and local governments. Federal expenditures for aviation include grants to governments and direct outlays for air traffic control.

SOURCE: CBO 2008b.

**TABLE 3-2 Private Business Expenditures for Transportation Equipment
(Excluding Automobiles and Light Trucks), by Type of Equipment, 2004**

Type of Equipment	Expenditures (\$ billions)
Trucks, buses, and trailers, other than light trucks	29.6
Aircraft	19.0
Railroad equipment	3.4
Ships and boats	4.5
Total	56.5

SOURCE: BEA 2007, Table 2.7.

Seventy-four percent of all infrastructure spending and 82 percent of all public spending shown in Table 3-1 is for highways. Although most highway traffic is passenger traffic, highways are the most important freight mode in terms of expenditures: about 80 percent of all shipper expenditures for freight transportation are for trucking. For comparison with the investment patterns, Table 3-3 shows an estimate of expenditures of U.S. shippers for goods transportation in 2007.

Public infrastructure capital spending, in constant dollars, was at the same level in the early 1980s as in the late 1950s. Since that time, capital spending has grown at about 2.5 percent annually, in constant dollars (Figure 3-1). From 1981 to 2008, constant-dollar public-sector capital expenditures for transportation infrastructure (excluding passenger rail and transit) grew at an average rate of about 3 percent annually.

TABLE 3-3 U.S. Expenditures for Goods Transportation, by Mode, 2007

Mode	Expenditures (\$ billions)
Motor carrier	671
Railroad	58
Air carrier	41
Water carrier	38
Oil pipelines	10
Other shipper costs	8

NOTE: Water carrier expenditures include all shipper expenditures for inland waterways and for ocean transportation of U.S. imports. Expenditures for air carriage are presumably on the same basis (expenditures for domestic transport plus transport of imports). “Other shipper costs” include traffic departments and some loading and unloading costs. In addition to the above, the source estimates shipper payments for forwarders’ services, net of forwarders’ payments to carriers, as \$30 billion; this figure appears high in comparison with other estimates. A published estimate of \$6 billion for freight forwarder annual net revenue (Page 2008) appears more likely.

Published estimates of expenditures for motor carrier services vary widely, mainly because a large share of the total is private carriage. The 25 largest for-hire trucking companies in 2005 had revenues of \$100 billion and operated one-sixth of the U.S. tractor fleet (Vise 2007, FHWA 2007). This group includes the major package express services, which have high average costs per vehicle, but excludes most local operators, which also have high costs per vehicle compared with long-distance general freight.

SOURCES: Council of Supply Chain Management Professionals 2008a, 2008b.

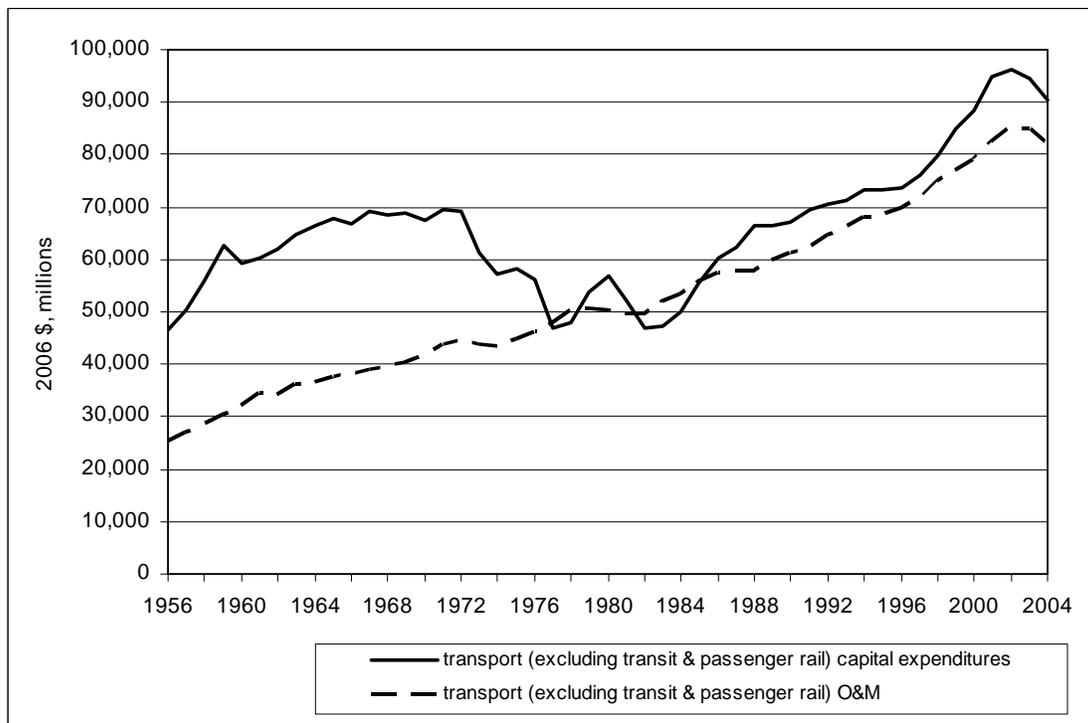


FIGURE 3-1 Public spending for transportation infrastructure (excluding transit and passenger rail) capital and related operation and maintenance (millions of 2006 dollars), 1956 to 2004 (CBO 2007). (Includes spending by federal, state, and local governments for highways and roads, aviation, and water transportation.)

FINANCE ARRANGEMENTS FOR PUBLIC FREIGHT INFRASTRUCTURE

The five subsections below describe finance arrangements for highway, water transport, and aviation facilities; compare arrangements across modes with respect to sources of funds and the federal share of funding; and describe several special federal programs for financial aid to infrastructure development.

Highways

The finance arrangements for the U.S. highway system were examined in detail by the Transportation Research Board (TRB) *Fuel Tax* committee (TRB 2006, 23–58, 83–91) and were described in Chapter 1. The characteristic features are as follows:

1. Imposition of user taxes and fees: federal and state excise taxes on motor fuels; fees for permits, registration, and licenses; and tolls. Receipts from these sources were \$116 billion in 2006, including toll receipts of \$9.6 billion (8 percent of the total) (FHWA 2007, Tables HF-10, SDF; FHWA 2008a, Table LDF).
2. Dedication by law of user tax and fee revenue (about 90 percent of the total) to transportation (mainly to highways, but also to transit). User taxes and fees cover most road and highway spending; revenues were equal to 78 percent of spending in 2006.
3. A division of responsibilities among the federal, state, and local governments for raising revenue and for highway spending. The federal government collects one-third of user tax and fee revenue, nearly all of which is distributed to state and local governments. State governments collect most of the remainder. States performed 62 percent of spending in 2006, nearly all covered by user tax and fee revenue. Local governments collect relatively little in user fees. Local government spending, 36 percent of the total in 2006, is funded with local government general revenue, dedicated broad-based local taxes, and state and federal aid (derived from user fee revenue).

Authorizations in the multiyear federal surface transportation assistance acts are limited by the balance in the federal Highway Trust Fund (into which are deposited the revenues of the federal highway user taxes) and the projected deposits from user tax revenues over the term of the act. In this way, the trust fund serves as a device to equate user tax revenue and transportation spending. Normally, a balance of several months' worth of average revenue has been kept in the trust fund to ensure against revenue fluctuations. However, the revenue projections that were the basis of the authorizations in the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) were overly optimistic, and consequently by 2008 the trust fund faced a deficit, jeopardizing funding for state transportation projects. To remedy the situation, Congress transferred \$8 billion to the trust fund from the general fund. The action was characterized as a restoration of certain sums (interest earnings imputed on trust fund balances) that 10 years earlier had been transferred from the trust fund to the general fund. Because this remedy entailed tapping the general fund rather than increasing revenue from users, it may be viewed as compromising the long-standing federal adherence to the principle of user-fee funding of highways (CBO 2008a; CBO 2008b, Appendix B).

The American Recovery and Reinvestment Act of 2009 (the economic stimulus package) (Public Law 111-5, February 13, 2009) provided \$27.5 billion for a highway infrastructure investment program that will function according to procedures that depart from the normal practice outlined above. The funds will be apportioned among the states by formula, similar to the practice in the normal federal-aid program. However, the spending is to be from general revenue rather than debited against the federal Highway Trust Fund, and no state matching share is required. A state may lose some or all of its apportionment if it does not obligate the funds before deadlines specified in the act.

Ports, Harbors, and Inland Waterways

Most large U.S. seaports are primarily nonoperating or landlord ports, that is, they lease land and facilities to terminal operators who service vessels and handle cargo. The ports earn revenue mainly from dockage and wharfage fees (assessed on vessels and on cargoes loaded and unloaded, respectively) paid by vessel operators and lease payments of the terminal operators. Revenue from these sources is supplemented at many ports by government support in various forms. Arrangements vary greatly, but some ports receive payments from governments out of their general tax revenues; revenues generated by other facilities (e.g., toll bridges and tunnels) operated by the authority; indirect subsidies through expenditures of the federal government for harbor dredging and expenditures of state and local governments for roads and other facilities that primarily serve the ports; and federal subsidies in the form of the tax exemption on interest payments for bonds the ports issue (Ricklefs 2000, 44). While some U.S. ports, including several of the largest, are self-sufficient (that is, revenue before subsidies exceeds their expenditures), others are not. No recent comprehensive analysis of port self-sufficiency has been conducted (Ricklefs 2000, 43–46). With few exceptions, port revenues historically have been expended solely for activities within the boundary of the port property (California ports are prohibited by law from using port revenues off-site).

The U.S. Army Corps of Engineers constructs and maintains harbor channels for public seaports. Maintenance dredging is funded by withdrawals from the Harbor Maintenance Trust Fund, which receives revenue from a federal ad valorem tax on import cargoes landing at ports with federally maintained channels (and which in recent years has accumulated a surplus equal to several years of disbursements). Costs of construction of new channels, channel deepening, and maintenance of channels more than 45 feet deep are shared between the federal government and the port or other local parties. The required local cost share depends on the characteristics of the project and varies from 35 to 65 percent (AAPA 2008). The federal share of costs for new channels and channel deepening is paid out of the federal general fund.

The Corps of Engineers also constructs and maintains locks and channels on the inland waterways. All maintenance is paid for out of the federal general fund. Half of expenditures for capital improvements to navigation facilities is paid by withdrawals from the Inland Waterways Trust Fund, which receives revenue from a federal excise tax on towboat fuel, and half is paid from the federal general fund.

TABLE 3-4 Port User Charges for Access Infrastructure or Impact Mitigation

	Rate and Base	How Collected	Initiated	Uses of Revenue	Revenue
Los Angeles and Long Beach Port-Related User Charges					
San Pedro Bay infrastructure cargo fee	\$15 projected initial fee per loaded TEU entering or leaving the Ports of LA and LB. Expected to vary between \$15 and \$18 depending on the costs of projects being supported; the portion of the fee dedicated to each project to be terminated after the project's construction is completed. Nonliquid bulk cargo fees to be determined.	Imposed by port authorities; charged to cargo owners; collected by terminal operators on behalf of port authorities.	2009 (expected)	Revenue deposited in Port Infrastructure Fund, exclusively for local transportation infrastructure for port access. To pay for prespecified shares of prespecified projects selected jointly by authorities and state and local governments; cargo-fee share of each project depends on port traffic share of total traffic on facilities constructed.	\$1.4 billion projected 2009–2014
PierPass traffic mitigation fee	\$50 per TEU or \$100 for any other size container for containers carrying export or import cargo arriving or leaving any terminal at the Ports of LA and LB by truck during peak hours (Monday–Friday 3:00 a.m.–6:00 p.m.). Empty containers and containers arriving or leaving the ports by rail via Alameda Corridor are exempt.	Collected by terminal operators on behalf of PierPASS, Inc., a not-for-profit organization formed by the ports' 13 terminal operators; ultimately charged to cargo owners.	2005	Net revenue is allocated to terminal operators to pay the costs of terminal operations during five additional weekly shifts during off-peak hours. The purpose of the charge is to reduce peak truck traffic, in order to reduce congestion on roads near the ports and reduce truck operators' waiting times.	\$125.5 million in 2007
Clean truck program fee	\$35 per loaded TEU entering or exiting the Ports of LA and LB by truck; low-emission trucks exempted.	As traffic mitigation fee	2009	To reimburse truck operators for 80 percent of the cost of purchase of low-emission trucks.	\$1.6 billion projected first 5 years
Alameda Corridor user fees and container charges	\$18.67 per TEU (in 2008) to transfer loaded containers in the corridor; other fees for empty containers and noncontainerized cargoes. Railroads also pay the fee for containers trucked around the corridor that leave Southern California by rail.	Paid by railroads to Alameda Corridor Transportation Authority, owner and operator of the corridor.	2002	To retire debt incurred to finance construction of the corridor (railroads reimburse Alameda Corridor Transportation Authority separately for maintenance of way).	\$95 million in FY 2007
Charges at Other Ports					
Port of Humboldt Bay harbor improvement surcharge	\$5.00 or \$10.00 per foot of draft for vessels of over 20 feet draft plus \$0.075 or \$0.15 per ton of cargo for vessels carrying over 10 tons of cargo, depending on which channel is used entering or leaving the harbor.	Collected by port from vessel operators.	2000	To repay a portion of the debt the port incurred for its \$5 million local share of a 2000 federal project that deepened the harbor entrance channels.	\$90,000 in FY 2008 (compared with \$220,000 payment on the deepening loan)
Port Authority of New York and New Jersey intermodal usage fee	\$52.50 per container, applicable to all containers moving via port authority intermodal rail facilities.	Collected from railroads by terminal operators on behalf of the port authority.	2004	To pay for construction and maintenance of ExpressRail, a system of local rail connections and sidings to bring on-dock rail service to the port's container terminals.	\$18 million in 2008

NOTE: TEU = 20-foot equivalent unit.

SOURCES: Shen 2008; Knatz 2008; Mongelluzzo 2008; PierPASS 2008a; PierPASS 2008b; Alameda Corridor Transportation Authority 2007; Alameda Corridor Transportation Authority 2008; Humboldt Bay 2006; Humboldt Bay 2008; PANYNJ 2006a; PANYNJ 2006b, 263.

Other Port Charges

In addition to the long-standing port charges described above, the revenues from which pay for on-site facilities and services, a few U.S. ports recently have imposed fees designed to pay for road and rail access infrastructure, environmental mitigation measures, or channel improvements, and for congestion management. The Ports of Los Angeles and Long Beach have been by far the most active in introducing such fees. Table 3-4 summarizes four fees introduced since 1998 at these ports as well as infrastructure fees at the Port of New York and New Jersey and the small Port of Humboldt Bay Harbor in California.

Other ports are studying infrastructure fees. The Port of Oakland has plans for a container fee to fund access infrastructure and pollution mitigation, similar to the purposes of the Los Angeles and Long Beach fees (Port of Oakland 2008). Bills have been introduced in the state legislatures of California and Washington calling for creation of state-level container fees to provide revenue for freight infrastructure improvements, but no such fee has been enacted. Ports are likely to be especially hesitant to impose new fees for fear of losing traffic during the period of declining traffic that began in 2007.

Federal Sanction of Port User Charges

A provision of the Water Resources Development Act (WRDA) of 1986 allows a “nonfederal interest” to impose port or harbor dues on vessels or their cargoes, with certain restrictions, provided the revenue is dedicated to paying for construction and operation of harbor navigation projects meeting certain criteria or for providing harbor emergency response services (33 USC Sec. 2236). That law was necessitated by a clause of Article 1 of the Constitution:

No State shall, without the Consent of the Congress, lay any Imposts or Duties on Imports or Exports, except what may be absolutely necessary for executing its inspection Laws: and the net Produce of all Duties and Imposts, laid by any State on Imports or Exports, shall be for the Use of the Treasury of the United States; and all such Laws shall be subject to the Revision and Control of the Congress.

WRDA 1986 imposed the present requirements for local matching contributions to the cost of federal capital projects to deepen harbor channels. The harbor dues provision was intended to provide a local revenue source to pay the local matching share. However, competition among the ports for traffic and availability of public funds for port improvements prevented imposition of the harbor dues.

The small Port of Humboldt Bay in northern California is apparently the only port to take advantage of the provision (Table 3-4). The fee was enacted in 1997 and imposed in 2000. It is \$5.00 or \$10.00 per foot of draft for vessels of over 20 feet draft plus \$0.075 or \$0.15 per ton of cargo for vessels carrying over 10 tons of cargo, depending on which channel the vessel uses approaching the harbor. The revenue is to retire a portion of the debt the port incurred for its \$5 million local share of a 2000 federal project that deepened the harbor entrance channels (Humboldt Bay 2006).

Aviation

Airports, like seaports, are operated by local public authorities, who receive revenue from rental payments from airlines and airport concessions, from parking fees, and from the locally imposed but federally supervised Airport Passenger Facility Charge added to price of the ticket of each passenger using an airport that chooses to collect the charge. Capital for terminal construction usually is raised by sale of revenue bonds backed by the airlines' lease payments and the airport's concession and parking revenue. Airports receive grants from the Federal Aviation Administration (FAA), drawn from the federal Airport and Airway Trust Fund, for construction of runways. For most projects, the federal share of the cost is 75 percent. The trust fund receives revenue from several excise taxes on passenger tickets and aviation fuel. Air traffic control services and facilities are directly provided by FAA and paid for by the trust fund. Of FAA's \$14.7 billion total expenditures in 2007 (including grants, air traffic control, and all other FAA activities), \$12.2 billion was paid for from the trust fund (FAA 2008a; FAA 2008b).

The Airport Passenger Facility Charge will be cited in Chapter 6 as a possible model for user charges on other kinds of facilities. As a condition of receipt of federal capital grants, federal law restricts the fees that airports may charge. A 1990 law authorized airports to impose the Passenger Facility Charge, collected from each passenger boarding an airplane at the airport. Federal law sets the maximum charge, at present \$4.50 per enplanement. Each airport chooses whether to impose the charge and may set a rate smaller than the maximum. The charge is collected by the airlines on behalf of the airports at the time of ticket sale. Each airport retains the entire revenue generated by the charge. An airport must obtain approval from FAA before it can begin collecting the charge. Federal law specifies the categories of capital improvements that airports may construct with Passenger Facility Charge revenue, and FAA must approve individual projects for funding with the revenue. As of 2009, 346 airports are collecting a Passenger Facility Charge, including nearly every major airport. Revenue from the charge totaled \$2.7 billion in 2008 (FAA 2009).

Comparison of Finance Arrangements Across the Systems

For the four systems for which government provides infrastructure, Table 3-5 compares total spending (including capital and operating expenditures), revenue from user taxes and fees, and the share of total funds provided by the federal government. The arrangements differ greatly among the modes. The federal share of total capital and operating expenditures ranges from nearly 100 percent for inland waterways to under 25 percent for highways and seaports. The ratio of user tax and fee revenue to expenditures ranges from 90 percent or higher for aviation and seaports to 10 percent for inland waterways.

These differences in finance arrangements reflect in part differences in physical characteristics (for example, air traffic control is most effectively operated as a single nationwide system) but also historical circumstances. At other times in the United States, and in other countries today, different distributions of responsibility for infrastructure among the central government, local governments, and the private sector would be found, as well as different divisions of financial responsibility between system users and taxpayers. The same diversity of practices, dependent on circumstances, will be evident among the case study projects described later in this chapter.

TABLE 3-5 Public Expenditures and Sources of Funds for Highways, Aviation, Inland Waterways, and Ports, 2006

	Highways	Aviation	Waterways	Seaports
User tax fee revenue (\$ billions)	116	26.7	0.1	5.0
Total expenditures (\$ billions)	150	29.7	0.9	5.3
Capital	79	13.7	0.5	
Operating	71	15.9	0.4	
User fee revenue/expenditures	0.77	0.90	0.10	0.95
Federal grants and direct spending (\$billions)	36	15.1	0.9	1.0
(Federal grants and direct spending)/expenditures	0.24	0.51	1.0	0.19

NOTE: User tax and fee revenue includes revenues collected by the federal, state, and local governments. Federal grants include distribution of revenue of federal user taxes and fees. Waterways and seaports expenditures do not include any federal expenditures other than those for the navigation program of the U.S. Army Corps of Engineers and certain other federal expenditures reimbursed from the Harbor Maintenance Trust Fund. Seaports expenditures include small amounts expended by state and local governments for inland waterways.

SOURCES: Highways: FHWA 2007, Table HF-10. Aviation: FAA 2007; CBO 2008b, Supplemental Tables; Bureau of the Census 2009, Table 1. Waterways: U.S. Army Corps of Engineers 2005; U.S. Congress 2006, p. 10; U.S. Department of the Treasury 2007. Seaports: Bureau of the Census 2009, Table 1; U.S. Army Corps of Engineers 2005; U.S. Congress 2006, p. 10; Institute for Water Resources 2008.

Federal Finance Provisions and Practices Relevant to Freight Infrastructure

This section describes certain special federal infrastructure programs that are of particular relevance for freight projects. Several components of the overall federal surface transportation assistance program (most recently reauthorized in SAFETEA-LU in 2005) were created with the needs of such projects in mind (although they were intended also for application to passenger facility finance). A review of experience with these provisions will be necessary in assessing finance reform proposals because most proposals are similar to existing programs with respect to goals, aid mechanisms, and demands placed on their federal administrators. The four programs described are the Transportation Infrastructure Finance and Innovation Act (TIFIA) credit assistance program, the Railroad Rehabilitation and Improvement Financing (RRIF) credit assistance program, the SAFETEA-LU Projects of Regional and National Significance program (and a similar provision in the 2009 economic stimulus package), and the SAFETEA-LU authorization of private activity bond (PAB) financing for certain kinds of highway and intermodal projects. TIFIA is examined in most detail because it has the most points of similarity, in intent and structure, with several of the prominent finance reform proposals described in Chapters 5 and 6. The other current programs are less frequently used or narrower in application. The final two subsections below describe the earmarking of specific projects to receive funding, which is a mechanism frequently used by Congress in providing federal assistance to freight projects, and regulations affecting foreign investment in U.S. infrastructure.

TIFIA

Special legislation was required in 1996 to authorize the federal loan to the Alameda Corridor. At about the same time, two California toll road projects received federal credit assistance through special legislation (USDOT 2000). Other project sponsors saw the potential value of such assistance, and ports in other regions wanted assurances that similar projects elsewhere would receive equal treatment. These reactions were among the motivations for the 1998 enactment of TIFIA, which provides federal credit assistance to infrastructure projects and was intended to institutionalize the form of federal assistance provided to the Alameda Corridor (TRB 2003, 43).

The U.S. Department of Transportation (USDOT) describes the purpose of the program as follows: “The TIFIA program is designed to fill market gaps and leverage substantial private co-investment by providing supplemental and subordinate capital to projects of national or regional significance” (USDOT 2006, 1). This description indicates that the program is not seen primarily as a mechanism to deliver subsidies to projects but as a way to exploit inherent federal government advantages in supporting projects that would be perceived as high risk by private-sector lenders and investors. An important source of risk is that projects like the Alameda Corridor are unusual; that is, they often depend on new organizations or new revenue sources that do not have a record of performance. The rationale for TIFIA is that the federal assistance can be justified in such circumstances, either because the cost of risk is lower to the federal government than for any smaller government or private lender by virtue of its large and diverse portfolio of investments and the spread of the burden of risk over a large number of taxpayers or because in a credit market where borrowers know more about their creditworthiness than lenders do, lenders will ration the availability of credit (Lucas and Phaup 2007, 4–14).

Increasing the leverage of federal assistance was a related goal of the program. The intent was that by accepting a share of the risk, the federal government could stimulate greater investment by state and local governments and the private sector in infrastructure projects.

TIFIA provides, at least potentially, a mechanism for the federal government to intervene constructively in the development of important projects for which private firms and state and local governments naturally have primary responsibility. The federal government can offer assistance to projects that have high economic value but pose serious challenges to the local responsible parties. Through TIFIA, it may be able to encourage finance arrangements that are economically beneficial from a national point of view and to attract private-sector cooperation in public–private projects by accepting a major share of project risk.

TIFIA offers sponsors of transportation infrastructure projects three kinds of assistance: direct federal loans, federal loan guarantees (ensuring repayment to buyers of project bonds), and lines of credit (a federal commitment to provide loans if needed). Federal credit is not to exceed one-third of the total project cost. Projects meeting all eligibility requirements in the law are evaluated by the Secretary of Transportation to determine whether federal assistance will be awarded.

The law specifies that the interest rate on a TIFIA direct loan must be no less than the yield on U.S. Treasury securities of similar maturity on the date of the loan agreement. Apparently USDOT policy has been to loan at near this minimum.

Eligibility originally was limited to projects costing \$100 million or more for construction of highways, transit, intercity passenger rail, or publicly owned intermodal transfer facilities; seaports, airports, and freight railroads were excluded. The 2005 federal surface

transportation assistance act (SAFETEA-LU) liberalized the rules to attract more applications and make the program more useful for freight. The minimum project was reduced to \$50 million and eligibility was extended to freight railroads, private intermodal terminals, and port intermodal and access facilities.

Project sponsors (borrowers) may be governments, public authorities, or private entities. Projects must be included in the state government transportation plan. The federal credit assistance must be repayable at least in part from user charges or other dedicated funding sources (e.g., a dedicated local sales tax), and these revenue sources must also secure other project obligations. The project's senior obligations (which usually are not the TIFIA loan) must receive an investment grade credit rating before the federal loan or loan guarantee can be executed (23 USC Sec. 603b).

The selection criteria specified in the law are the following (23 USC Sec. 602b):

- (i) The extent to which the project is nationally or regionally significant, in terms of generating economic benefits, supporting international commerce, or otherwise enhancing the national transportation system.
- (ii) The creditworthiness of the project. . . .
- (iii) The extent to which assistance . . . would foster innovative public-private partnerships and attract private debt or equity investment.
- (iv) The likelihood that assistance . . . would enable the project to proceed at an earlier date than the project would otherwise be able to proceed.
- (v) The extent to which the project uses new technologies, including intelligent transportation systems, that enhance the efficiency of the project.
- (vi) The amount of budget authority required to fund the Federal credit instrument made available under this chapter.
- (vii) The extent to which the project helps maintain or protect the environment.
- (viii) The extent to which assistance . . . would reduce the contribution of Federal grant assistance to the project.

Decisions on awards are made by the USDOT Credit Council, which is composed of senior officials from the Office of the Secretary and the modal administrations. The TIFIA Joint Program Office in USDOT administers the program (Figure 3-2).

According to the provisions of the Federal Credit Reform Act of 1990, the cost in the federal budget of a federal loan program is the present value of expected future loss to the federal government from commitments made during the budget year. The 1998 surface transportation assistance act authorized \$530 million over 5 years, debited to the Highway Trust Fund, to pay for expected losses on TIFIA loans (this amount, known as the subsidy cost, is, in effect, the cost of an insurance premium paid into a reserve account, in keeping with the terms of the 1990 act) and capped the total of loans offered or guaranteed at \$10.6 billion. The 2005 federal surface transportation assistance act, SAFETEA-LU, authorized \$610 million for the budget cost of the program over the 5 years 2005–2009, sufficient to allow about \$13 billion in credit assistance. Congress has since rescinded part of the originally authorized funding.

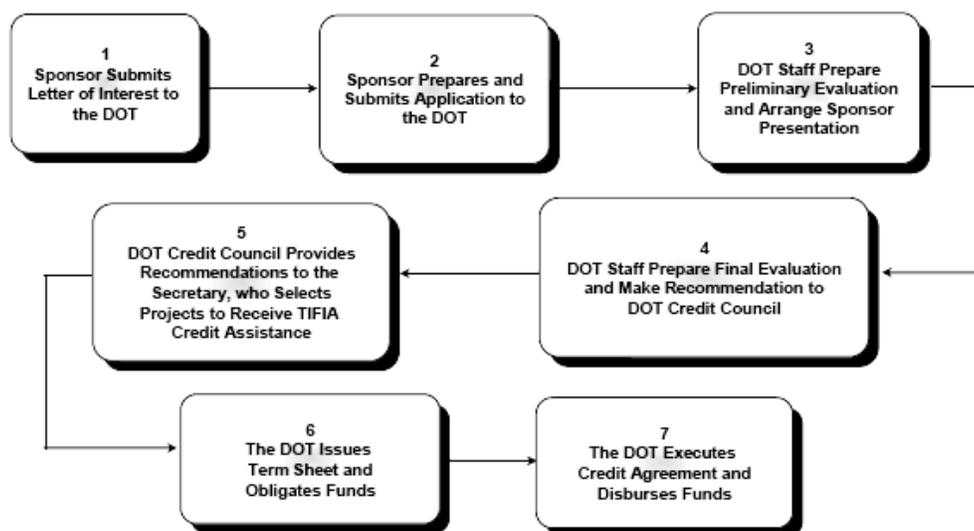


FIGURE 3-2 Selection of projects to receive TIFIA assistance (USDOT 2007, 1–4).

Advantages to Project Sponsors USDOT identifies flexible repayment schedules as a major attraction of TIFIA loans to project sponsors. Loan terms can allow the start of repayment to be delayed up to 5 years after project completion. Negative amortization (i.e., loan payments smaller than interest accruals in each period) can be allowed for an initial period, and repayment schedules can be adjusted according to the performance of revenue streams. These features reduce the risks of loan default if the revenue stream backing the loan does not meet expectations. Private credit market products can provide some of these features but may not match the combination of high flexibility and low interest cost of the TIFIA loans (USDOT 2006; USDOT 2002). Apparently in some instances borrowers have found the added flexibility of TIFIA terms to be worth the cost of a higher interest rate on the federal loan, compared with the rate tax-exempt bonds would carry. (Beginning in late 2008, the yield on tax-exempt bonds, normally lower historically than that of the comparable-term Treasury bond, rose to well above the Treasury yield in reaction to the 2008 financial crisis, greatly increasing the attractiveness of TIFIA loan terms.)

The liberal provisions of the federal loan to a TIFIA project allow the borrower to obtain a higher credit rating and lower interest rate on the senior obligations it issues to finance the project (although, as described below, a TIFIA loan is not technically subordinate, since it is treated equivalently to senior debt in the event of a default). The federal endorsement implied by a TIFIA loan may in itself aid in attracting private investors to a project.

TIFIA Projects From its inception through April 2008, the TIFIA program had received 32 applications for a total of \$6.9 billion in credit assistance (USDOT 2008d) and had awarded assistance to 14 projects (through 15 credit agreements) for credit amounts totaling \$4.3 billion, of which \$3.7 billion was in the form of direct loans and \$600 million was a loan guarantee to one project. One additional loan of \$500 million was near final agreement. No line of credit has been issued.

The \$4.3 billion in credit assistance awarded is well below the totals that the congressional authorizations would have allowed (\$10.6 billion in 1998 and approximately \$13 billion in 2005). The \$1 billion of TIFIA loans that have been fully repaid represent additional unused credit capacity.

TIFIA has been little used for freight-related projects. The recipients (Table 3-6) are eight highway projects (including the Cooper River Bridge in South Carolina, constructed to remove an obstruction to vessel entry to the Port of Charleston); six transit, passenger rail, and passenger intermodal facilities projects; and the Reno ReTRAC rail–highway grade separation project (USDOT 2008a). Cooper River Bridge and ReTRAC are the only projects in which freight-related benefits were a primary motivation.

No borrower has yet defaulted on a TIFIA loan. Several projects that received TIFIA assistance have retired their TIFIA loans early by refinancing (Table 3-6). For example, in 2004, 3 years after receiving a TIFIA loan, the South Carolina Transportation Infrastructure Bank repaid the Cooper River Bridge loan by refinancing with tax-exempt bonds carrying a lower interest rate than the federal loan. Similarly, the City of Reno refinanced its loan for the ReTRAC with tax-exempt bonds after 4 years. Also, the Alameda Corridor Transportation Authority repaid its 1997 federal loan, which preceded and was the model for TIFIA, in 2004, 28 years before maturity, with proceeds from the sale of taxable and tax-exempt revenue bonds, at a significant saving in interest cost (FHWA 2004). USDOT regards these early retirements as consistent with the goals of the program: “The Department believes that TIFIA assistance best meets interim, not long-term financing needs. As a project passes through the various stages of development . . . the risks to investors decline as actual costs and revenues become known. Should the project become attractive enough to enable it to obtain all financing from the existing capital markets, the Department would prefer that it do so” (USDOT 2006, 5).

Assessments of TIFIA Performance The criterion for judging TIFIA should be whether the program has allowed the completion of projects that have produced high economic returns that nonetheless would not have been constructed, or whose construction would have been delayed, without the federal assistance (and that such benefits are not canceled by losses on poorly performing projects).

The TIFIA program contains a requirement for USDOT to report every 2 years to Congress on the “financial performance” of the projects receiving assistance under the program and to recommend whether the program should be continued, turned over to a government corporation, or ended (23 USC Sec. 609; USDOT 2006). The USDOT reports have not contained quantitative economic assessments of the value of the program. USDOT’s 2006 report to Congress concluded that “several more years must pass before the Department can assess the program’s actual long-term costs and benefits” (USDOT 2006, 8). Nonetheless, USDOT concluded that “the TIFIA program especially benefits a clearly defined niche of project financings—user backed start-up projects lacking prior market access, where investors must absorb construction risk, performance risk, and demand risk. For these projects, which under the best of circumstances would achieve a senior debt rating no better than the lowest investment grade category, the TIFIA program seems to be filling a market gap by offering attractively priced subordinate and supplemental capital.”

A 2006 evaluation by the Office of Management and Budget (OMB) concluded as follows: “TIFIA helps fill a specific market niche by financing large user-fee funded start-up transportation infrastructure projects, such as new toll roads. These types of projects often lack

TABLE 3-6 Approved TIFIA Projects

Year Approved	Project	Project Type	Project Cost (\$ millions)	Instrument Type	Credit Amount (\$ millions)	Primary Revenue Pledge
Active Credit Agreements						
1999	Miami Intermodal Center Rental Car Facility (Florida)	Intermodal	1,350	Direct loan	270	User charges
1999	Washington Metro (District of Columbia)	Transit	2,324	Guarantee	600	Interjurisdictional funding agreements
2001	Central Texas Turnpike (Texas)	Highway	3,181	Direct loan	917	User charges
2003	South Bay Expressway (California)	Highway	653	Direct loan	140	User charges
2005	183A Toll Road (Texas)	Highway	331	Direct loan	66	User charges
2005	LA-1 toll highway (Louisiana)	Highway	247	Direct loan	66	User charges
2006	Warwick Intermodal Station (Rhode Island)	Intermodal	222	Direct loan	42	User charges
2006	Pocahontas Parkway/Richmond Airport (Virginia)	Highway	748	Direct loan	150	User charges
2007	Capital Beltway/I-495 HOT Lanes Project (Virginia)	Highway	1,998	Direct loan	589	User charges
2007	SH-130 Corridor (Texas)	Highway	1,360	Direct loan	430	User charges
Total					3,270	
Commitments Awaiting Credit Agreements						
2006	Intercounty Connector (Maryland)	Highway	2,466	Direct loan	516	User charges
Total					516	
Retired Credit Agreements						
1999	Miami Intermodal Center (Florida)	Intermodal	^a	Direct loan	269	Tax revenues
1999	Tren Urbano (Puerto Rico)	Transit	2,250	Direct loan	300	Tax revenues
2000	Cooper River Bridge (South Carolina)	Highway	677	Direct loan	215	Infrastructure bank loan repayments
2000	Staten Island Ferries (New York)	Transit	482	Direct loan	159	Tobacco settlement revenues
2001	Reno Rail Corridor (Nevada)	Intermodal	280	Direct loan	50	Room and sales tax
Total					994	
Total, all categories			18,569		4,780	

NOTE: Project costs are as of date of TIFIA financial closing.

^a The cost of this project is included in the \$1,350 million shown in the first line of the table (there were two loans for one project).

SOURCE: USDOT 2008e.

access to private capital because of their size, complexity, and risk” (OMB 2006). OMB further concluded that “TIFIA’s open-ended guidelines do not necessarily ensure it provides the most cost-efficient financing options. . . . Federal policy holds that it would generally be less costly for the government to guarantee loans [rather than loan directly]” and that “the program’s design does not ensure the promotion of private investment in transportation infrastructure or stipulate that TIFIA assistance addresses a market failure. TIFIA does not require a minimum level of private investment for individual projects, and it has not explicitly targeted assistance at projects lacking access to private capital.”

Factors Hindering Use As noted above, only two primarily freight-related projects have received TIFIA assistance. Among the possible causes of the program’s failure to attract more freight project applications are that its requirements are too restrictive, that the kinds of credit assistance it provides are more readily available from other sources, or that few worthwhile projects of the kind envisioned by the framers of the law exist. As noted, the 2005 SAFETEA-LU amendments liberalized eligibility by expanding the kinds of facilities that qualify and lowering the minimum project size.

Several features of the program have been cited as limiting TIFIA’s utility:

- Until the recent interest rate movements noted above, the interest rates on loans, based on the cost to the government of borrowing through bonds with terms similar to those of TIFIA loans, may not have been attractive to highly creditworthy projects that are eligible for tax-exempt bond financing. However, the program was not conceived as an aid to projects with ready access to commercial credit.
- The process of applying for TIFIA assistance, USDOT review, and final execution of the credit agreement has been time-consuming in some instances, and potential borrowers have been discouraged by its uncertainty. The OMB 2006 evaluation reported improvement in the speed of one stage of the process, from Secretarial approval to execution of the agreement, between 2000 and 2006, although only a few agreements were made in that period. Delays of 1 to 2 years have sometimes occurred in reaching the Secretarial decision.
- While a TIFIA loan ordinary is normally treated as subordinate to other loans made to a project sponsor, the TIFIA legislation requires that, in the event of bankruptcy of the borrower, TIFIA debt be treated equivalently to other senior debt (23 USC Secs. 603, 604). This provision may reduce the attractiveness of bonds issued by TIFIA-backed projects (Jones 2001).
- As TIFIA is now administered, a federal commitment cannot be obtained until the formal loan agreement is signed and firm commitments are in place for all other elements of the finance plan, including the revenue stream to repay the federal loan. In the past, USDOT provided contingent commitments based on execution of a preliminary term sheet (an outline of the terms of the agreement), which helped expedite the negotiating process that is essential in finalizing finance arrangements for complex projects. An earlier, contingent federal commitment sometimes could be valuable.
- Projects receiving TIFIA assistance must comply with the contracting rules (including Davis–Bacon Act employment rules and Buy America provisions) that apply to projects receiving federal highway or transit grants (as specified by U.S. Code Titles 23 and 49), adding to project costs.

A USDOT policy statement of 2008 (under the previous administration) proposed further modifications in TIFIA rules to encourage greater use. USDOT summarized the proposal as follows (USDOT 2008c, 54):

[T]he proposal increases the Department's flexibility to structure credit support for vital projects expected nevertheless to produce little revenue in the early years of operation. . . . The TIFIA Program would be modified in the following manner. . . .

- **Repayment Flexibility:** TIFIA repayment schedules, deferral periods and maturity dates would be approved on a case-by-case basis, not prescribed by statute, with a deferral preference for facilities financed in part or primarily by users.
- **Federal Requirements:** TIFIA credit assistance in the form of loan guarantees or lines of credit would not be subject to Title 23 and Title 49 requirements, with the exception of Davis–Bacon prevailing wage laws. . . .
- **Direct Pricing:** TIFIA credit assistance to be repaid from direct facility pricing would be available for up to 50% of eligible project costs. If TIFIA credit assistance were to be repaid from direct facility pricing and were provided for 33% or less of eligible project costs then such TIFIA credit assistance would not be subject to Title 23 or Title 49 requirements apart from Davis–Bacon provisions.
- **Guarantees and Lines of Credit:** Loan guarantees and lines of credit would be available to supplement a secured loan provided for 33% or less of eligible project costs, as long as the total amount of TIFIA credit assistance did not exceed 40% of eligible project costs.

These USDOT proposals emphasize relaxing federal contracting requirements, allowing the TIFIA loan to cover a larger share of project costs in some circumstances, and providing incentive for funding through direct facility user charges.

Although no TIFIA project has yet defaulted on a commitment to the federal government, any actions to expand or promote greater use of the program may entail federal acceptance of greater risk. The budgetary cost of the program would thereby increase. OMB, rather than USDOT, is responsible for budget scoring and risk ratings of federal programs, but USDOT program managers will require analytic capability for risk assessment to evaluate proposals and design assistance packages that reasonably share risk. This capability will be critical if federal credit assistance programs become more active. Program managers will need contingency plans for dealing with the financial and political consequences of an eventual actual federal loss.

RRIF

A second federal program, RRIF, provides credit assistance to operators of private and public freight and passenger railroads for capital expenditures. Like TIFIA, it was created in 1998 and amended in SAFETEA-LU. The term of loans may be up to 25 years, and the interest rate, as in TIFIA, is the interest rate on Treasury bonds of similar terms. Unlike TIFIA, under which

Congress appropriates the capital reserve required to cover the government's expected losses on the loans, RRIF requires applicants to pay the reserve themselves to the federal government.

Compared with the authorized cap on its loans of \$35 billion, the program has not been heavily used. Through October 2008, 21 RRIF loans totaling \$748 million had been executed. A \$100 million loan to Amtrak in 2002 and two loans to the Dakota, Minnesota & Eastern Railroad (DM&E) in 2003 and 2007, totaling \$281 million, account for half the total. Other than the DM&E loans, the largest loan for freight infrastructure was \$50 million to the Tex-Mex Railroad in 2005. Most RRIF loan agreements have been for amounts less than \$15 million. The freight railroads receiving assistance have all been short lines or regional railroads (FRA 2008). Apparently the loan terms have not been attractive enough to the large railroads to compensate for the costs of administrative and regulatory requirements imposed on recipients of federal assistance.

PABs

The interest paid on bonds issued by state and local governments to finance public facilities is exempt from federal income tax. Government bonds that finance facilities for private use do not qualify for this favorable tax treatment unless the facility constructed is on a list of categories of "exempt facilities" specified in federal law. SAFETEA-LU expanded the list of exempt facilities to include privately built highways and certain other transportation facilities that are built with federal aid.

SAFETEA-LU, Section 11143, provides that any project to construct highway or intermodal truck-rail transfer facilities that receives aid through the federal surface transportation assistance program is eligible to be financed with tax-exempt bonds. A project potentially benefiting from this provision (that is, not previously eligible for tax-exempt bond financing) would be organized as some form of public-private partnership, and the bonds would be issued by state and local governments on behalf of the private developers. Receipt of a TIFIA loan would be one way such projects could receive federal aid and thus become eligible for tax-exempt bond finance. The Secretary of Transportation is given broad discretion to select the projects authorized to issue the bonds, within the \$15 billion cap on the total value of the bonds set in the act.

The SAFETEA-LU PAB program received significant initial interest. As of December 2008, USDOT had approved eight projects to issue PABs totaling \$4.9 billion (one-third of the total the law authorized), although only one project, the Capital Beltway high-occupancy toll lanes in Virginia, has issued the bonds (FHWA 2008b). Previous TRB committees recommended allowing tax-exempt finance for privately developed infrastructure competing with publicly built facilities so that tax law is neutral with respect to private versus public development (TRB 2006, 195-196; TRB 1998, 107). However, some projects eligible for PABs under the terms of SAFETEA-LU (e.g., intermodal terminals) do not compete with public infrastructure; therefore, in these cases the justification for the subsidy is not evident.

A USDOT policy statement in 2008 (under the previous administration) proposed modifications to the SAFETEA-LU PAB provisions to increase the attractiveness of this form of federal assistance (USDOT 2008c, 45):

In order to provide the private sector with access to tax-exempt interest rates on a level-basis with the public sector, and to increase private sector investment in U.S. transportation infrastructure, the PAB program would be reauthorized without a national volume cap. Furthermore, in order to encourage private investment in U.S. transportation infrastructure, the reauthorization bill would amend the Internal Revenue Code with respect to qualified highway and freight transfer facilities to authorize (a) the use of an accelerated depreciation schedule for capital projects financed with PABs, (b) back-loaded structures on toll projects financed with PABs, and (c) the use of PABs to finance private investment in existing infrastructure.

PABs have other features that limit their usefulness. Conventional tax-exempt bonds may be issued with provision for deferral of initial interest payments, but deferral of interest on a PAB is not possible. Therefore PABs are not well suited for start-up projects that will depend on self-generated revenue to repay their bonds. Deferral of interest payments is desirable for such projects because of the delay between initiation and the time when the completed facility reaches its full revenue potential.

SAFETEA-LU Projects of National and Regional Significance Program and Stimulus Package Discretionary Grants

SAFETEA-LU created a new federal-aid program category, Projects of National and Regional Significance (Section 1301). The program was funded at \$1.8 billion over 5 years (less than 1 percent of the total in the act). The act describes a competitive grant process by which the Secretary of Transportation is to award funding to projects proposed by the states. However, Congress also earmarked the entire authorized amount, designating 25 projects in 17 states. In the act, the ostensible features of the program are to be as follows:

- It is for high-cost transportation infrastructure projects: over \$500 million or 75 percent of the state's annual federal-aid apportionment.
- Eligible projects may be "any surface transportation project eligible for Federal assistance under Title 23, United State Code, including freight railroad projects and activities eligible under such title." Title 23 is the law governing the federal-aid highway program, which allows use of funds for rail or other nonhighway purposes only under limited circumstances. Nonetheless, several of the earmarked projects have major rail components.
- A project must be justified by showing that it will "generate national economic benefits," "reduce congestion, including impacts on the State, region and Nation," "improve transportation safety," or "otherwise enhance the national transportation system." Eligibility is not limited to freight-related projects.
- The Secretary of Transportation is to consider the extent to which the project leverages the federal investment by bringing funding from state, local, and private sources. The federal share is to be 80 percent of project costs, or less if the applicant requests less.

USDOT has published a final rule (73 FR 63362, October 24, 2008) implementing the project selection process in the act, anticipating that the program may at some point receive

unearmarked funding. The rule states evaluation criteria in general terms similar to the language of the act.

Among the 25 projects that Congress designated to receive funding under the program are two of the case studies described below, the Heartland Corridor and CREATE. USDOT's 2007 report to Congress on the Projects of National and Regional Significance program (USDOT 2008b) shows that, through 2007, of the 25 projects, federal funds had been obligated for only 12, and for six projects, USDOT had not yet received project descriptions or requests for release of federal funds from sponsors. The Secretary's transmittal letter to the report states: "The Department believes . . . that a number of these projects may not reflect projects that are truly of National and Regional Significance, but in fact are projects which reflect local interests, and would have been more appropriately funded from other categorically specific funds. . . ." Of 14 projects whose descriptions USDOT includes in the report, nine are urban expressway projects, including bridge replacements, interchange construction, and lane additions; three are freight rail-highway grade crossing projects in urban areas (Alameda East in Southern California; Commonwealth Railway relocation in Portsmouth, Virginia, an element of the Heartland Corridor project; and CREATE in Chicago); one is a rail mainline double-stack clearance project (Heartland Corridor); and one is a collection of rail, highway, and transit improvements. The Section 1301 federal grant is a small share of the estimated total cost of most projects (for example, \$125 million out of \$4.6 billion for Alameda Corridor East). For the two elements of the Heartland Corridor receiving Section 1301 funds, the combined federal share is 50 percent (\$105 million out of \$210 million).

The American Recovery and Reinvestment Act of 2009 (the economic stimulus package) provided \$1.5 billion for Supplementary Discretionary Grants for a National Surface Transportation System (Title XII, Public Law 111-5, February 13, 2009), a program in some respects similar to the SAFETEA-LU Projects of National and Regional Significance program but more liberal with respect to project eligibility and funding provisions. Mass transit, port, public- and private-sector rail, and highway projects are eligible for grants to be awarded competitively by the Secretary of Transportation. Funding for the program is to be from general revenue rather than debited against the federal Highway Trust Fund, and no state or local matching share is required. The law allows USDOT to use part of the funds to pay the federal budgetary subsidy cost of credit assistance offered to transportation projects.

Project Earmarking in Federal Surface Transportation Legislation

OMB (an agency of the executive branch) defines earmarks as follows:

Earmarks are funds provided by the Congress for projects or programs where the congressional direction (in bill or report language) circumvents the merit-based or competitive allocation process, or specifies the location or recipient, or otherwise curtails the ability of the Executive Branch to properly manage funds. Congress includes earmarks in appropriation bills—the annual spending bills that Congress enacts to allocate discretionary spending—and also in authorization bills.

By OMB's count, SAFETEA-LU of 2005 contained 6,301 earmarks totaling \$23.1 billion in spending authorizations, 9 percent of total authorizations in the act. Earmarking in the federal-aid highway program grew steadily from 1 percent in the 1982 act (Surface Transportation

Assistance Act) to the level in the 2005 act (TRB 2006, 45). OMB also has found that Fiscal Year 2008 appropriations for the Corps of Engineers Civil Works program (which includes construction and maintenance of harbor channels and the inland waterways) included 1,338 earmarks for \$3.0 billion, about half of total appropriations for the program (OMB 2008).

The TRB *Fuel Tax* Committee noted that the impact of earmarking depends on whether the projects that Congress chooses have greater benefits than the projects that federal, state, and local executive agencies would choose if they received the funds through formula or competitive grants. To the extent that the executive agencies have well-developed and effective processes for capital programming and project selection, earmarking will divert some funds from higher-payoff to lower-payoff projects (TRB 2006, 45–46). A possible defense of earmarking is that it may be the most practical way for government to provide large sums to projects that are rare or unique and that are concentrated geographically in one or a few regions. Managing aid to projects of this nature through a rules-based bureaucratic procedure would be challenging.

Constraining earmarking would not deny Congress ultimate control of the use of federal funds. For federal assistance to transit projects through the New Starts program and in federal water resources projects, federal law has created a process that requires evaluation of project proposals by the responsible executive agencies and final congressional approval of agency-recommended expenditures. Congress oversees the federal-aid highway program by requiring USDOT to prepare periodic reports on progress in meeting congressional goals with regard to the condition and performance of the highway system.

Regulation Affecting Foreign Investment

The Organisation for Economic Co-operation and Development (OECD) has assessed U.S. practices affecting foreign investment in transportation infrastructure to be more restrictive than the OECD average. These practices include operational restrictions on foreign carriers that make foreign investment unattractive by reducing profit potential and restrictions on foreign equity ownership in U.S. facilities. Such restrictions may tend to reduce the overall rate of investment in U.S. transportation infrastructure.

OECD attempts to produce an objective “foreign direct investment regulatory restrictiveness index” for each of 16 industry sectors in each of 28 countries, based on ratings of the degree to which each country’s laws and regulations (for example, restrictions on market entry, restrictions on operations, and limits on foreign equity ownership in domestic firms) discriminate against foreign firms or foreign investment. The analysis indicates that in the United States, and typically in other high-income countries, the air and maritime sectors are among the most restrictive with regard to foreign direct investment. The U.S. restrictiveness indices were comparable with the average among OECD member countries in the maritime sector and more restrictive than average in aviation. Road transport was judged to be relatively open to foreign direct investment in the United States and in most other countries (OECD 2007, 136–143).

Foreign investment is recognized as an essential source of capital throughout the U.S. economy. Foreign direct investment (i.e., the purchase of assets in the United States by foreign firms or individuals for the purpose of acquiring a lasting interest in an enterprise) averaged \$144 billion annually in 2000–2006. Foreign companies employ 5 million workers in the United States and produce one-fifth of all U.S. exports (GAO 2008, 1; Kaplan and Teslik 2007).

Furthermore, U.S. businesses and individuals are major investors abroad, and the openness of other countries to U.S. investment presumably depends to a degree on U.S. reciprocal openness.

Foreign investment plays a major role in transportation infrastructure development in many countries, and several large multinational firms are active in projects worldwide. An example of this activity is the concession agreement between the State of Texas and an international consortium for construction and operation of segments of State Highway 130, one of the case studies summarized below.

U.S. law recognizes the national security implications of foreign acquisition of certain categories of U.S. firms or assets (for example, defense suppliers and critical infrastructure facilities) and the need to balance security concerns with the economic benefits of foreign investment. The President has the authority to prohibit a foreign acquisition if it is determined to present a security threat. The established process for review of security implications of foreign investments was revised and strengthened in 2007 (GAO 2008, 1-7).

CASE STUDY ILLUSTRATIONS OF FINANCE ARRANGEMENTS

Cases are a necessary information source for examining freight infrastructure finance because of the diversity of practices among the federal, state, and local government agencies and private firms that build and operate facilities. The committee commissioned case studies of projects to help it to observe the following:

- Characteristics of projects that appear to have influenced the selection of finance arrangements,
- Choices of project sponsors with regard to user fees and subsidies,
- The role of federal leadership or funding contributions in the projects,
- The nature and distribution of the benefits of the projects and how the benefits relate to finance choices, and
- Alternative institutional arrangements for initiating and managing projects.

Results of past studies suggest that the freight-related projects that are the most challenging and that require special institutional and finance arrangements often share two characteristics. First, they are intended to yield a mix of direct benefits both to the commercial users and operators of the freight facility and to the broader public (for example, through reduced congestion for local passenger travel and reduced pollution). Second, they are institutionally complex; that is, they require action or assent from many jurisdictions (local governments, special authorities, sometimes more than one state government, and the federal government) and multiple private-sector parties (e.g., railroads and terminal operators). Most of the case studies selected exhibit both characteristics.

The committee commissioned two authors to assemble case study information (Ortiz and Maring 2008; Smith 2008). The number of case studies obviously is too small to be representative. The committee selected projects that have been prominent in discussions of infrastructure policy and sought to include examples of inland and port-related projects; highway, rail, and multimodal projects; and projects in which states, local governments, and the federal government have primary responsibility. The committee specified that each case study contain a history of the project; descriptions of the institutional arrangements for constructing

and operating the facility, intended benefits, finance arrangements, and methods of evaluations; and, for completed projects, a comparison of outcomes with expectations.

Annex 3-1 is a summary of the case study projects, indicating physical characteristics, status, organization, finance, and intended benefits. The eight cases are as follows:

- *CREATE*, a proposed package of capital improvement projects along five rail corridors in the Chicago region. The projects include 25 underpasses and overpasses to separate road and rail traffic; six flyovers to separate intersecting freight and passenger rail lines; and improvements to tracks, switches, and signals. The purpose of the improvements is to speed the passage of rail freight through Chicago and reduce passenger travel delays caused by grade crossings and other conflicts between freight and passenger traffic. The case study refers to the original plan as it was publicly discussed in 2005–2007. Because the project in this form did not proceed, a revised form of the proposal may emerge.
- *ReTRAC* in Reno, Nevada, a 2.3-mile-long trench through downtown Reno to carry the mainline tracks of the Union Pacific Railroad, eliminating conflicts with street traffic and reducing other community impacts of rail traffic. The project, completed in 2005, was conducted by the city.
- The *Heartland Corridor* in Virginia, West Virginia, Kentucky, and Ohio, a package of rail and intermodal improvements under construction between Portsmouth, Virginia, and Columbus, Ohio, to open a new double-stack container route between the Port of Virginia and the Midwest. The project includes relocation of a rail line in Portsmouth to eliminate highway grade crossings and increase capacity; tunnel modifications to provide clearance for double-stack container trains through the Appalachians along the Norfolk Southern Railroad line; and construction of three intermodal terminals in Virginia, West Virginia, and Ohio.
- *TransTexas Corridor I-35*, a new toll-funded highway paralleling I-35, a major north–south route through eastern Texas from Gainesville (north of Fort Worth) to Laredo on the Mexican border. The state has contracted with a private firm that will finance, build, and operate one segment of the route under a concession agreement. The project to build this segment is now undergoing environmental review. The highway is one element of the state’s TransTexas Corridor plan, a statewide network of corridors to include highways with separate truck lanes and right-of-way for rail lines. In January 2009, the state announced that it was withdrawing the TransTexas Corridor as a long-range plan. The plan had become controversial on account of the proposed reliance on toll funding and public–private partnerships. This action did not directly affect projects already in development that were elements of the plan.
- The *Alameda Corridor* in Los Angeles County, California, a 20-mile grade-separated rail line operated by the Alameda Corridor Transportation Authority, connecting the Ports of Los Angeles and Long Beach to rail yards of the BNSF and Union Pacific Railroads, completed in 2002. Trains to and from the ports avoid the older, more circuitous railroad branch lines, eliminating 200 grade crossings and increasing train speeds. The intended benefits are to reduce conflicts between rail and street traffic, reduce air pollution, facilitate on-dock and near-dock transfer of containers to rail in order to reduce truck transport, and provide capacity for future growth of traffic.
- The *Delaware River Channel* dredging project, to deepen from 40 to 45 feet the navigation channel from Delaware Bay to Philadelphia Harbor, a distance of 100 miles, to allow larger ships to serve the port. The project has been authorized by Congress and is supported by the State of Pennsylvania and the Philadelphia Regional Port Authority but does not yet have full

federal funding and has been controversial because of questions about benefits, the sources of local matching funds, disposal of dredging spoils, and potential impact on competition between Philadelphia and the Port of New York and New Jersey.

- The *Port Inland Distribution Network* (PIDN) of the Port of New York and New Jersey. As implemented, PIDN was a container barge service between the Port of New York and New Jersey and Albany, New York, initiated in 2003. The service was one element of a broader planned strategy to move containers by barge and rail between the port and a series of inland terminals, as a means to increase container throughput capacity and reduce the need for terminal expansion at the ports. A portion of non-New York metropolitan area freight would be removed from the local highway network, reserving this capacity for the growth of local traffic. The intended benefits were the ability of the Port of New York and New Jersey to retain market share with less expansion of terminal capacity at the port, and reduced congestion and pollution from truck traffic. The service had higher operating costs and lower traffic volume than had been anticipated and in 2005 was discontinued.

- The *California Inter-Regional Intermodal System* (CIRIS), a proposal to set up and operate a container service over the existing rail line between the Port of Oakland, California, and the Central Valley region of northern California, operated with the aid of a public subsidy. The service would carry mainly agricultural products that now travel to the port by truck. The railroad does not now offer intermodal service, which is normally not commercially practical over such a short distance. The intended benefits are removal of trucks from congested parallel highways and market development for the port. The project does not yet have funding.

Other Current Projects

To supplement the case studies, the committee compiled a list of significant freight infrastructure projects that have been completed recently, are under construction, or are planned or under serious consideration (Annex 3-2). For inclusion on the list, the committee sought capital projects that are large (most cost more than \$200 million), important for freight transportation, and, if not already under way or completed, appear to have some prospect for completion. Public and private projects and projects in all freight modes were included, as well as multimodal projects. The six case studies that are capital projects are included. The list cannot be regarded as comprehensive or quantitatively representative. Inclusion of a project implies no judgment about its merit. Projects in California are overrepresented because the state is developing a package of bond-funded projects and recently completed a goods movement plan, so information about potential projects is available. The projects in Annex 3-2 are grouped in seven functional categories:

- Port access,
- Urban hubs and bottlenecks (other than ports),
- Mainline capacity expansions,
- Rail and intermodal terminals,
- Marine terminals,
- Marine navigation, and
- Air cargo facilities.

The purpose of compiling the list was to illustrate characteristics of the pool of large freight infrastructure projects that have sought funding in recent years—the range of scales, objectives, and participants—and to illustrate the variety of finance arrangements employed. To design programs to fund and carry out freight projects, an understanding of the characteristics of this candidate pool will be essential.

Observations from the Cases and Projects

The case studies and the tabulation of other projects described in the preceding section offer support for the following observations relevant to the committee's charge. The observations concern the scope and objectives of public involvement in freight infrastructure projects; the relation of finance arrangements to the characteristics and outcomes of projects; and the planning, programming, and evaluation practices of public agencies.

Scope and Objectives of Public Involvement

- State governments and the public port authorities are the principals for a large majority of the projects in Annex 3-2, because these public entities own and operate most of the infrastructure. The exceptions are the projects of the freight railroads and the directly federally operated waterways and harbor channels. The federal government is involved in some capacity in nearly every project. This involvement includes funding assistance, usually for only a minority of costs except in highway projects, and regulation. Federal environmental regulation is among the motivations for some projects, and environmental regulation affects costs and schedules. Rail projects are subject to federal review for competitive and environmental impacts. Federal-aid highway program rules restrict use of tolling as a revenue source and dictate design features that drive costs.
- Nearly all the projects that are receiving or seeking public funding support can be classified into one of three categories according to their objectives:
 - Projects in which the primary or exclusive motivation is to provide capacity to serve commercial freight traffic (e.g., the Heartland Corridor and the Delaware River Channel). These projects' justifications often cite benefits to the public beyond the commercial users of the facilities, but freight capacity appears to have been their original impetus.
 - Projects in which a major motivation is to reduce the congestion, pollution, and other harmful community impacts of truck or rail traffic through urban areas. This is the predominant objective of ReTRAC, Alameda East, and CIRIS. It was a major motivation for the Alameda Corridor and for PIDN.
 - Projects to construct capacity for both freight and noncommercial road or transit traffic on shared facilities (e.g., nearly all aviation and highway projects, and some elements of CREATE that upgrade rail lines that are shared by freight and commuter traffic).

Relation of Finance Arrangements to Project Characteristics

- Finance arrangements for projects with public involvement are eclectic, especially for projects not fully covered by the established federal grant programs. In some instances,

apparently similar projects have used very different finance arrangements (e.g., the Colton Crossing and Kansas City flyover projects). In some instances, public funds may have supported projects that could have gone forward with less taxpayer assistance and more funding from user charges or from the resources of the private-sector participants. For example, the magnitude of revenue from user charges that would be required at ports to pay for substantial access infrastructure improvements would be only a small fraction of the value of the goods shipped through all U.S. ports, and therefore it is reasonable to expect that such charges would be feasible, with only small impacts on the total volume of port traffic (although the distribution of traffic among ports would be affected).

- The case studies suggest that expectations of external aid influence the physical and organizational shape of a project. The Alameda Corridor sponsors originally sought a federal grant to cover a large share of the project's costs but then proceeded with funding based on user charge revenue after the grant failed to materialize. The CREATE project's sponsors planned an ambitious scope, dependent on external funding, in which a large share of costs was for capital improvements (the rail-rail flyovers) that primarily would benefit local commuter rail service. A federal grant of the size anticipated was not obtained; now elements of the original plan are proceeding, including improvements serving both freight and passenger mobility, which presumably have been determined to be among the most cost-effective and practical (CREATE 2008). Heartland Corridor sought and received a federal grant covering half of construction costs; however, the experience of other projects suggests that an alternative form of the project might have gone forward with support from the private parties and directly involved state and local governments, if the full federal grant had not been received.

- Annex 3-2 includes examples of possibly valuable projects that are not yet funded. Each of the major port regions is working on finance and organizational arrangements to carry out identified projects to expand access capacity to accommodate anticipated trade growth. CREATE, as noted above, is making slow progress, but the funding and organizational arrangements that would be required to resolve the most costly rail congestion and freight-passenger conflicts in the Chicago region are not yet in place. Potential resources to pay for many such projects exist; for example, user fees similar to those that have paid for the Kansas City flyover and for the Alameda Corridor have been suggested in Chicago (Giblin 2006), and elements of some of the projects would be eligible for federal credit assistance. However, the parties that ultimately would be required to commit funds or to raise revenue have yet to negotiate the mutually acceptable formula that will allow the project to go forward. The Port Authority of New York and New Jersey notes in its strategic plan that many elements of the plan "require extensive, complex partnerships with public and private entities" (PANYNJ 2006c, 11).

- CIRIS and PIDN are primarily noncapital solutions to problems that some of the other projects attack with capital projects. Both were projects to provide an operating subsidy to nonhighway transport services to the port, intended in part to reduce truck traffic on port access routes. Although these two projects may not be feasible because of particular cost or market features, they suggest the possibility that noncapital alternatives to solving community impact problems should be explored more fully.

Planning and Evaluation

- In certain of the cases and projects in Annex 3-2, public officials' assessment of the benefit of the project depends on the assumption that the government will be obligated to provide

capacity for any volume of future freight traffic that may materialize with the present level of user charges, regardless of the cost to the public. This assumption (sometimes called the predict-and-provide planning model) underlies the estimates of savings in state highway costs from reduced truck traffic in the Heartland Corridor project. In PIDN, the port authority hoped it would save because the subsidy to the barge service would be less than losses it would incur if it were required to accommodate container traffic growth with new facilities at the ports. Similarly, in the Delaware River and other channel projects, the ports describe themselves as obliged to dredge deeper channels to accommodate the larger ships that the carriers plan to operate. In each of these cases, freight traffic on public facilities is not paying charges sufficient to cover the cost of providing service. An alternative to accepting higher traffic volume at high cost to the public would be to increase charges. If higher charges generated sufficient revenue, capacity could be expanded. If revenue from higher charges were insufficient, then expanding capacity would not be economically justified, but the higher charges would avoid excessive congestion and divert traffic to alternative routes and modes (for example, diverting some truck traffic to rail, or some port traffic to ports with lower costs). Historically, ports avoided imposing user charges because they were willing to operate at a loss in order to maintain market share (Ricklefs 2000). This objective was politically defined and was seen as consistent with the ports' role as engines of local economic development.

- The case studies corroborate the evidence cited in Chapter 2 that evaluations in support of public infrastructure investment decisions are inadequate to ensure that the investments with the greatest national economic benefits are being selected. Economic evaluations often did not appear to enter into the decision-making process, but rather were prepared for the purpose of winning support for decisions already made. The shortcomings identified included failure to compare the project with alternatives (and in particular, failure to compare capital and noncapital alternatives), failure to distinguish local from national benefits, optimistic assumptions about demand, lack of transparency, and absence of sensitivity analysis.

- Annex 3-2 includes projects whose economic justification has been called into question by independent reviews. For example, the upper Mississippi and Delaware River projects of the Corps of Engineers have been controversial. Evaluations of these projects have been heavily scrutinized in part because the Corps of Engineers is required to conduct detailed economic evaluations. Most other public-sector projects on the list have not been subject to nearly as detailed evaluation as the Corps of Engineers procedures are intended to produce. Most Corps of Engineers capital projects derive half or less of their funding from project user charges, although port channel capital projects generally have 40 to 60 percent local funding. It is reasonable to expect that the greater is the responsibility of users and other local interested parties for paying for projects, the less is the likelihood that a project with low return on investment will be able to advance.

REFERENCES

Abbreviations

AAPA	American Association of Port Authorities
BEA	Bureau of Economic Analysis
CBO	Congressional Budget Office
FAA	Federal Aviation Administration

FHWA	Federal Highway Administration
FRA	Federal Railroad Administration
GAO	Government Accountability Office
OECD	Organisation for Economic Co-operation and Development
OMB	Office of Management and Budget
PANYNJ	Port Authority of New York and New Jersey
TRB	Transportation Research Board
USDOT	U.S. Department of Transportation

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ANNEX 3-1 Case Studies Summary

	CREATE	ReTRAC	Heartland Corridor	TransTexas Corridor I-35
I. Project Description				
Description	Rail corridor improvements, including grade separation (rail-rail and highway-rail); safety enhancements; system upgrades; other.	2.3-mile-long, 33-foot-deep trench to accommodate and separate rail traffic through downtown Reno.	Double-stack clearance between Roanoke, Virginia, through West Virginia to Columbus, Ohio; three intermodal facilities; and rail line relocation.	Toll road; full corridor (now canceled) included truck lanes, separate freight and passenger rail lines; utility corridors.
Status	Originally proposed project did not proceed. Some elements were initiated in 2007.	Completed: <ul style="list-style-type: none"> • Start: August 2002 • Completion: 2005 	Under way: <ul style="list-style-type: none"> • <i>Rickenbacker intermodal facility</i> <ul style="list-style-type: none"> • Start: summer 2005 • Completion: March 2008 • <i>Commonwealth Railway relocation</i> <ul style="list-style-type: none"> • Start: July 2007 • Completion: N/A • <i>Double-stack clearance</i> <ul style="list-style-type: none"> • Start: fall 2007 • Completion N/A 	Segments 1 through 3 of SH-130 completed; Segments 4 through 6 under way <ul style="list-style-type: none"> • <i>Segments 1 through 4</i> <ul style="list-style-type: none"> • Start: 2002 • Completion: spring 2008 (expected) • <i>Segments 5 and 6</i> <ul style="list-style-type: none"> • Start: N/A • Completion: N/A (Planning/NEPA process under way)
II. Organization				
Responsible entity and organization structure	Public-private partnership between state, City of Chicago, and railroads.	City of Reno	Norfolk Southern for double-stack clearance and Rickenbacker intermodal facility; Virginia Port Authority for rail line relocation; Virginia and West Virginia for planned intermodal facilities.	TxDOT
Primary source of leadership	State department of transportation/City of Chicago	City of Reno	Norfolk Southern	TxDOT

ANNEX 3-1 (continued) Case Studies Summary

	CREATE	ReTRAC	Heartland Corridor	TransTexas Corridor I-35
II. Organization (continued)				
Stakeholders	<ul style="list-style-type: none"> • State of Illinois • City of Chicago • Metra • Amtrak • BNSF • CN • Canadian Pacific • CSX • Norfolk Southern • Union Pacific • Belt Railway Company of Chicago • Indiana Harbor Belt Railroad 	<ul style="list-style-type: none"> • City of Reno • Washoe County • State of Nevada • Union Pacific • Downtown casinos and businesses 	<ul style="list-style-type: none"> • States of Virginia, West Virginia, and Ohio • Virginia Port Authority • Columbus Regional Airport • Federal Highway Administration • Eastern Federal Lands Highway Division 	<ul style="list-style-type: none"> • TxDOT • Texas Transportation Commission • Fluor • Cintra-Zachry
III. Intended Benefits (i.e., apparent motivations of sponsors and supporters)				
Road congestion	Medium	High	Low	High
Rail congestion	Medium	Medium	Low	Low
Air quality	High	Medium	Medium	Low
Other	<ul style="list-style-type: none"> • Safety – medium • Economic development – high • Redevelopment – low 	<ul style="list-style-type: none"> • Economic development – medium/high • Safety – high 	<ul style="list-style-type: none"> • Reduced freight rail travel times – high • Economic development – high • Safety – medium 	<ul style="list-style-type: none"> • Safety – medium • Economic development – medium
IV. Finance Arrangements				
Project costs:				
i. Capital	<ul style="list-style-type: none"> • \$1.5 billion (full program as originally proposed) • \$330 million (Phase I) 	<ul style="list-style-type: none"> • \$280 million 	<ul style="list-style-type: none"> • \$309 million 	<ul style="list-style-type: none"> • \$200+ billion (full corridor, now canceled) • \$5 billion (SH-130)
ii. Operating/ other	N/A	N/A	N/A	N/A

(continued)

ANNEX 3-1 (continued) Case Studies Summary

	CREATE	ReTRAC	Heartland Corridor	TransTexas Corridor I-35
IV. Finance Arrangements (continued)				
Sources of funds	<p><i>Phase I:</i></p> <ul style="list-style-type: none"> • Federal grants/earmarks: 30.3% • State: 30.3% • Local: 9% • Private: 30.3% <p><i>Full project:</i></p> <ul style="list-style-type: none"> • Private: 15% (\$232 million) 	<ul style="list-style-type: none"> • City of Reno: 86% • Federal grants/earmarks: 8% • Private (Union Pacific): 6% 	<p><i>Double-stack clearance</i></p> <ul style="list-style-type: none"> • Federal earmark: 63% • Virginia and Ohio grants: 7% • Private (Norfolk Southern): 30% <p><i>Roanoke intermodal facility</i></p> <ul style="list-style-type: none"> • Virginia grant: 70% • Private (Norfolk Southern): 30% <p><i>Rickenbacker intermodal facility</i></p> <ul style="list-style-type: none"> • Federal earmark: 49% • Private (Norfolk Southern): 51% <p><i>Commonwealth Railway relocation</i></p> <ul style="list-style-type: none"> • Federal earmark: 25% • State grants/matching funds: 72% • Private (Commonwealth Railway): 2% 	<p><i>Segments 1-4:</i></p> <p>State/local highway user tax revenue and highway program grants</p> <p><i>Segments 5-6</i></p> <p>Private equity: 25%</p>
Loans and credit assistance	N/A	<ul style="list-style-type: none"> • TIFIA loan (\$50.5 million) • City of Reno bonds (\$111.5 million) 	N/A	<p><i>Segments 1-4:</i></p> <ul style="list-style-type: none"> • TIFIA (\$16.8 million) • TxDOT fuel tax bonds (\$2.3 billion) <p><i>Segments 5-6:</i></p> <ul style="list-style-type: none"> • TIFIA (\$412.1 million) • Private debt (\$596.5 million)

ANNEX 3-1 (continued) Case Studies Summary

	Alameda Corridor	Delaware River Dredging	NYNJ PIDN	CIRIS
I. Project Description				
Description	A 20-mile, grade-separated, consolidated rail route from the Ports of Los Angeles and Long Beach to rail terminals.	Navigation channel deepening for 102 miles in the Delaware River, from deep water to the Port of Philadelphia.	Container barge service between Ports of New York and New Jersey and Port of Albany, New York.	Short-haul rail container service between Port of Oakland and Central Valley markets.
Status	In operation since 2002, with volume at or near forecasts.	Seeking final approvals and funding.	Discontinued	Seeking sponsorship and funding, railroad acquiescence.
II. Organization				
Responsible entity and organization structure	ACTA, a Joint Powers Authority	U.S. Army Corps of Engineers and local sponsor—initially the Delaware River Port Authority, now the Philadelphia Regional Port Authority	Port Authority of New York and New Jersey, Port of Albany	No definitive organization as yet; related Joint Powers Authority being established.
Primary source of leadership	Initially regional ports and planning agencies, later ACTA	Corps, local ports, local refineries, governor, key legislator	Port Authority of New York and New Jersey	Ports of Oakland and Stockton, San Joaquin Council of Governments
Stakeholders	<p>ACTA</p> <p>State and regional planning and environmental agencies</p> <p>Ports</p> <ul style="list-style-type: none"> • Los Angeles • Long Beach <p>Railroads</p> <ul style="list-style-type: none"> • BNSF • Union Pacific • Pacific Harbor Lines <p>Cities</p> <ul style="list-style-type: none"> • Long Beach • Carson • Compton • Downey • Paramount • Los Angeles • Commerce • Bell Gardens • Others 	<p>U.S. Army Corps of Engineers</p> <p>Philadelphia District Delaware River Port Authority</p> <p>Philadelphia Regional Port Authority</p> <p>Port of Philadelphia</p> <p>Regional refineries</p> <p>Delaware River Maritime Enterprise Council</p> <p>Delaware Riverkeeper Network</p> <p>Other environmental groups</p>	<p>Port Authority of New York and New Jersey</p> <p>Port of Albany</p> <p>Columbia Coastal (barge operator)</p> <p>Customers</p>	<p>Ports</p> <ul style="list-style-type: none"> • Port of Oakland • Port of Stockton <p>Railroads</p> <ul style="list-style-type: none"> • BNSF • Union Pacific <p>California Department of Transportation</p> <p>Regional planning agencies</p> <ul style="list-style-type: none"> • San Joaquin Council of Governments • San Francisco Metropolitan Transportation Commission <p>Potential customers</p>

(continued)

ANNEX 3-1 (continued) Case Studies Summary

	Alameda Corridor	Delaware River Dredging	NYNJ PIDN	CIRIS
III. Intended Benefits (i.e., apparent motivations of sponsors and supporters)				
Road congestion	Medium	N/A	Low	Medium
Rail congestion	High	N/A	Low	Low
Air quality	Medium	N/A	Low	Low
Capacity	High	Port and waterway capacity—high	Port capacity—medium	N/A
Other		Economic development—low	Economic development—low	Economic development—medium
IV. Finance Arrangements				
Project costs				
Capital	\$2.3 billion	\$306 million	Minor	Up to \$25 million
Operating	\$34 million annually, more than covered by operating revenue		\$3.3 million	At least \$1 million annual subsidy at start-up, up to \$10 million annual subsidy at full operation
Sources of funds	Ports: 17% Local grants: 15% Revenue bonds: 51% Use fees: 100% of operating cost and debt retirement	Proposed: Federal: 61% Local/state matching funds: 39%	Federal CMAQ grant—Port Authority of New York and New Jersey—operating subsidy Barge revenue	Unknown Proposed: state infrastructure bonds, county tax revenue, operating revenue, CMAQ
Loans and credit assistance	\$400 million from USDOT: 17%	N/A	N/A	N/A

NOTE: ACTA = Alameda Corridor Transportation Authority; CMAQ = Congestion Mitigation and Air Quality Program; NEPA = National Environmental Policy Act; TxDOT = Texas Department of Transportation.

ANNEX 3-2 Illustrative Current Freight Infrastructure Capital Projects

Project	Mode	Status	Cost (\$ millions)	Description	Principals	Funding
Port Access						
Gerald Desmond Bridge, Long Beach, California	Highway	Planned; partial funding	610	Replace bridge to eliminate port access bottleneck for trucks	State department of transportation and possibly Port of Long Beach	\$300 million earmarked federal aid; remainder possibly from state or port access fee, or both
Alameda Corridor, Los Angeles County, California	Rail	Completed 2002	2,300	20-mile grade-separated rail line connecting Ports of Los Angeles and Long Beach to rail yards	Alameda Corridor Transportation Authority, ports, railroads, cities	Ports, \$400 million; state and local grants, \$400 million; bonds backed by corridor revenue, \$1.2 billion; federal loan to be repaid from revenue, \$400 million
SR-47 Expressway, Los Angeles County, California	Highway	Not funded	420	Increase capacity on access route through Los Angeles to ports	California Department of Transportation	Possibly conventional highway funding or California infrastructure general obligation bonds
I-710 improvements, Los Angeles County, California	Highway	Environmental impact study under way	3,600 to 6,900 for prominent options	Capacity expansion of 18-mile urban expressway and truck route connecting Port of Long Beach to central Los Angeles County	Los Angeles County Metropolitan Transportation Authority, State of California, local councils of government, port authorities	None committed
Alameda Corridor East, California	Rail	Phase I under way	497 (Phase I) 918 (Phase II)	Grade separations at 20 rail highway crossings and safety improvements at 39 crossings in Southern California to reduce rail-passenger conflicts	Alameda Corridor East Construction Authority, State of California, Los Angeles County Metropolitan Transportation Authority	\$1.5 billion reported to be committed from state transportation bond issue, Los Angeles dedicated sales tax, state highway funds, federal earmark (\$125 million), and other sources
FAST, Washington State	Highway, rail	8 projects in package of 25 completed	864	Grade-crossing eliminations and highway improvements for trucks to improve port access and reduce freight-passenger traffic conflicts	Washington State Department of Transportation, ports, Puget Sound Regional Council	Of committed funds for Phase I projects (\$486 million): 39% federal grants, 8% ports, 4% railroads, 49% other state and local government
ExpressRail, Port of New York and New Jersey	Rail	7 of 10 projects completed	450	Provide on-dock rail facilities, support track, and connections to regional rail	Port Authority, railroad, port terminal operators	Funded by Port Authority from own resources including container fee for project

(continued)

ANNEX 3-2 (continued) Illustrative Current Freight Infrastructure Capital Projects

Project	Mode	Status	Cost (\$ millions)	Description	Principals	Funding
Port Access (continued)						
Cooper River Bridge, South Carolina	Highway	Completed 2005	677	Replace highway bridges to increase navigation clearance for ships entering Charleston harbor and provide for future highway traffic growth	State department of transportation, South Carolina State Ports Authority, City of Charleston	\$215 million bond issue to be repaid by South Carolina Department of Transportation, Ports Authority, city. Remainder conventional highway funding. Bond issue replaced a TIFIA loan
Liberty Corridor highway and rail capacity expansion, New Jersey	Highway, rail, transit	Initial projects in package under way	600 (Phase 1)	Package of road, rail, and transit improvements on corridor from New York–New Jersey ports to Trenton, and near ports	New Jersey Department of Transportation, New Jersey Turnpike Authority, Port Authority of New York and New Jersey, CSX Railroad	\$100 million federal Projects of National and Regional Significance earmark; remainder from state, Port Authority, CSX Railroad
Urban Hubs and Bottlenecks (other than ports)						
Louisville Ohio River bridges, Kentucky and Indiana	Highway	Design and right-of-way acquisition under way	4,100	Construct new bridges and interchange at confluence of Interstate routes 64, 65, and 71 to relieve bottlenecks	Kentucky Transportation Cabinet, Indiana Department of Transportation	Federal-aid project; tolls have been considered
ReTRAC, Reno, Nevada	Rail, highway	Complete	280	2.3-mile trench to separate rail line from street traffic through Reno	City of Reno, Union Pacific Railroad	City, 74% (dedicated taxes); Union Pacific, 18% (cash and in-kind); federal grant, 8%
CREATE, Chicago, Illinois	Freight rail, highway, commuter rail	Some elements under way	1,500	Rail corridor improvements and grade separations in Chicago	State, city, commuter rail authority, five railroads	Undecided; majority would be federal, state, and local funds
Otay Mesa port of entry highway improvements, California	Highway	Partially under construction; further phases in planning	670 (SR-905); later planned phases, 700	Construct SR-905 connecting U.S.–Mexico port of entry with I-805. Later phases are further highway expansion and port of entry facilities	State, San Diego Association of Governments	Regular federal-aid highway funding, SAFETEA-LU border program and earmark; other federal grants. Later phases to include tolls and private concession
Colton Crossing, Colton, California	Rail	In planning	200	Flyover to eliminate at-grade crossing of two rail mainlines	BNSF Railroad, Union Pacific Railroad, State of California	\$97 million from state 2006 transportation bond issue, balance from railroads proposed, but terms not resolved

ANNEX 3-2 (continued) Illustrative Current Freight Infrastructure Capital Projects

Project	Mode	Status	Cost (\$ millions)	Description	Principals	Funding
Urban Hubs and Bottlenecks (other than ports) (continued)						
Sheffield and Argentine Flyovers, Kansas City, Missouri	Rail	Completed 2000 (Sheffield); 2005 (Argentine)	75 Sheffield; 60 Argentine	Flyovers to eliminate at-grade crossing of BNSF and Union Pacific–Kansas City Southern mainlines	BNSF, Union Pacific–Kansas City Southern, Kansas City Terminal Railway, USDOT	Sheffield financed by bonds of state-chartered corporation backed by USDOT letter of credit; property tax abatement. Flyover users pay fees to retire debt
Detroit–Windsor Bridge, Michigan	Highway	U.S. environmental approvals issued; construction 2010–2013	4,200 (U.S. 1,800; Canada 2,400)	Bridge over Detroit River between Detroit and Windsor, supplementing three existing Southeastern Michigan highway crossings, which carry 60% of U.S.–Canada truck traffic	Federal Highway Administration, Michigan Department of Transportation, Transport Canada, Ontario Ministry of Transportation	Planned to be a toll bridge built and operated by a private concession. Some project components may be publicly funded
Baltimore rail tunnels replacements, Maryland	Rail	Preliminary conceptual study completed	1,300 for freight components in most promising alternative	Replace tunnels and improve alignment on freight and passenger rail lines through Baltimore to provide double-stack clearance and higher speeds	None yet identified; would require participation of CSX Railroad, Amtrak, and city, state, and federal governments	None yet identified. Partial public funding has been proposed
SR-509 access highway, Washington State	Highway	Environmental review, design in progress	1,006	Truck access route to Sea-Tac and industrial area, bypassing I-5	Washington State Department of Transportation	Federal-aid project. To be funded partially from state highway funds, partially from special bond issue (not yet approved)
I-95 New Haven Harbor Crossing Corridor, Connecticut	Highway	Construction under way; to be completed 2014	1,000–1,700	Lane additions and bridge replacement on 7 miles of I-95 in New Haven, an intercity commercial link and local commuter route	Connecticut Department of Transportation	Federal-aid project; bond issue planned for state matching share
Bridging the Valley rail corridor, Spokane Valley, Washington–Idaho	Highway, rail	Construction of first elements scheduled	300	Eliminate 72 rail–highway grade crossings on BNSF and Union Pacific mainlines in Spokane Valley. Includes moving Union Pacific mainline operations into BNSF corridor	Washington State Department of Transportation, Idaho Department of Transportation, local governments, BNSF and Union Pacific Railroads	Full funding not yet committed. Largest source will be state transportation program funds, including federal aid. Federal earmark has been sought. Railroads would bear some costs

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ANNEX 3-2 (continued) Illustrative Current Freight Infrastructure Capital Projects

Project	Mode	Status	Cost (\$ millions)	Description	Principals	Funding
Mainline Capacity Expansions						
Union Pacific Railroad Sunset Corridor–Sunrise Project, California, Arizona, New Mexico, Texas	Rail	Under construction (2006–2010)	2,000	Package of capacity enhancements, including double-tracking, terminal expansions, on Union Pacific line from Los Angeles to El Paso	Union Pacific Railroad	Corporate resources
Upper Mississippi–Illinois River lock replacements, Minnesota, Iowa, Wisconsin, Illinois	Inland waterways	Authorized by Congress in 2007; awaiting construction appropriation	3,600 (1,900 locks construction; 1,700 environmental mitigation)	Replace five locks on Mississippi and two on Illinois, with locks allowing passage of 1,200-foot barge tows	U.S. Army Corps of Engineers	Construction: 50% Inland Waterways Trust Fund, 50% federal general fund; mitigation: 65% federal general fund, 35% states and local governments
TransTexas Corridor I-35	Highway	Turnpike authority segments completed; concession in planning	5,000	Segments of a major intercity highway being constructed as a toll road; part to be built and operated by a private concession	Turnpike authority, state, private concession holders	Turnpike authority segments: bonds and TIFIA loan backed by tolls; concession segments: privately raised capital and TIFIA loan backed by tolls
Heartland Corridor, Virginia, West Virginia, Ohio	Rail	Construction under way	309 (original 2005 estimate)	Double-stack clearance on rail route from Hampton Roads to Columbus, Ohio; intermodal terminals; port rail line relocation	Norfolk Southern Railroad, Commonwealth Railway, Federal Highway Administration, Virginia Port Authority, Virginia, West Virginia, Ohio	Norfolk Southern, \$81 million; Virginia, \$57 million; Ohio, \$0.8 million; Commonwealth Railway, \$11 million; federal government, \$140 million; other sources to be determined (2005 plan)
DM&E Railroad track upgrade, Minnesota, South Dakota, Iowa	Rail	Completed	40	Upgrade track and bridges on a regional short line railroad to carry heavier railcars	DM&E Railroad	Financed by a 2003 RRIF loan of \$234 million, including \$194 million for refinancing DM&E debt for earlier improvements and \$40 million for new improvements
Crescent Corridor	Rail	Norfolk Southern presented detailed proposal	1,000–3,000	Capacity enhancements and terminals on 1,400-mile corridor from New Orleans and Memphis to Northeast	Norfolk Southern Railroad, federal and state sponsors	None committed; railroad has proposed government assistance

ANNEX 3-2 (continued) Illustrative Current Freight Infrastructure Capital Projects

Project	Mode	Status	Cost (\$ millions)	Description	Principals	Funding
Rail and Intermodal Terminals						
Intermodal Container Transfer Facility expansion, Carson, California	Rail	Awaiting approval of Intermodal Container Transfer Facility Joint Powers Authority	300	Expansion of near-dock rail yard for making up container trains at Ports of Los Angeles and Long Beach	Union Pacific Railroad, Intermodal Container Transfer Facility Joint Powers Authority (landlord)	Corporate resources
Southern California International Gateway near-dock rail terminal	Rail	Undergoing local environmental review	200	New near-dock rail terminal for transferring containers between truck and rail at Ports of Los Angeles and Long Beach	BNSF Railroad	Corporate resources
CenterPoint Intermodal Center, Crete, Illinois	Rail-highway intermodal	Developer has acquired property	500 for commercial development; additional public infrastructure required	Rail-truck container transfer facility and warehouse park	CenterPoint Properties, Inc. Railroad tenant not yet identified	Corporate resources. Developer supported tax increment financing for local public infrastructure improvements and in 2007 applied for SAFETEA-LU private activity bond allocation
Marine Terminals						
APM terminal, Portsmouth, Virginia	Marine	Phase I completed 2007	430	New 1 million TEU/year privately constructed and owned container terminal; served by Heartland Corridor	APM Terminals North America, State of Virginia	\$400 million APM capital expenditure from corporate resources; \$30 million public expenditure for roads, etc.; state tax incentives
Craney Island terminal, Portsmouth, Virginia	Marine	Authorized by Congress; planning studies completed	671 landfill and dredging; 2,200 total project	Landfill using harbor dredging spoils to create area for a new marine terminal	U.S. Army Corps of Engineers, Port of Virginia	\$356 million for 50% federal cost share authorized in WRDA 2007; no federal funds appropriated
Oregon Gateway terminal, Coos Bay, Oregon	Marine	Preliminary planning and negotiations; project in abeyance	400-700	Construct a 2 million TEU/year container terminal at the Port of Coos Bay; deepen navigation channel; upgrade short line rail connections	Port of Coos Bay; State of Oregon. APM Terminals has held discussions with port. U.S. Army Corps of Engineers would deepen channel	State has approved lottery revenue for state share of dredging. No other funding committed
SSA Marine terminal, Port of Tacoma, Washington State	Marine	Cooperative agreement among parties 2008; land acquired; 2012 completion	300	SSA Marine to construct and operate 1 million TEU/year terminal on land of Puyallup Tribe adjacent to Port of Tacoma	SSA Marine, Puyallup Tribe, Port of Tacoma	SSA Marine from corporate resources (terminal construction); port to participate in channel and road improvements

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ANNEX 3-2 (continued) Illustrative Current Freight Infrastructure Capital Projects

Project	Mode	Status	Cost (\$ millions)	Description	Principals	Funding
Marine Terminals (continued)						
Long Beach liquefied natural gas terminal, California	Marine	Project opposed by local officials; sponsor did not obtain lease from port; has been abandoned		2005 proposal by private firms to construct a terminal to receive shipments of liquefied natural gas at Port of Long Beach	Sound Energy Solutions, LLC, ConocoPhillips, port, Federal Energy Regulatory Commission	Corporate resources
Port of Long Beach Middle Harbor terminal redevelopment	Marine	Environmental reviews completed; construction 2009–2019	750	Reconfiguration of two existing terminals. Capacity to be increased by 2 million TEU/year; on-dock rail expanded	Port of Long Beach	Port revenue from tenant leases
Marine Navigation						
Delaware River channel dredging, Delaware, Pennsylvania	Marine	In planning; approvals and funding not obtained	306	Deepen navigation channel in Delaware River to Port of Philadelphia	U.S. Army Corps of Engineers; Philadelphia Regional Port Authority	Federal, \$187 million; balance from port, from own revenue and other state and local sources (proposed)
Port of Oakland 50-foot channel dredging, California	Marine	Near completion	426	Widen and deepen navigation channels and turning basins	U.S. Army Corps of Engineers, Port of Oakland	Federal, \$217 million; port, \$209 million, primarily from own resources
Port of New York and New Jersey 50-foot harbor channel dredging	Marine	Under construction; 2014 completion	1,590	Deepen harbor channels to 50 feet	U.S. Army Corps of Engineers; Port Authority of New York and New Jersey	\$880 million federal; \$710 million Port Authority of New York and New Jersey
Air Cargo Facilities						
Miami International Airport Cargo Development Program	Air	Completed 2005	500	Construct 3.5 million square foot air cargo handling buildings and related facilities (Miami is largest international air cargo airport in United States in terms of tonnage)	Miami International Airport, carrier tenants	Airport revenue from tenant leases and fees
FedEx Greensboro regional air hub	Air	Air cargo hub facility completed 2009; runway under construction	300 air cargo facility; 140 runway; additional expenditures for road connections	Construct FedEx air cargo hub freight handling facility and runway to serve air freight flights	FedEx, Piedmont Triad Airport Authority	Air cargo facility constructed by FedEx from corporate resources; county provided tax incentives. Runway funded by airport revenue and federal grant

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Government Responsibilities for Freight Infrastructure

The study charge asks the committee to analyze the rationale for public investment in freight transportation projects of national significance and to develop criteria for defining national significance. This chapter analyzes government responsibilities in three steps. The first section below examines the need for involvement by federal, state, or local government, through public investment or other means. The second section identifies circumstances that dictate a need for federal government involvement and the relevance of the “national significance” concept in defining the appropriate federal role. The third section considers the question of when direct public involvement in building or paying for infrastructure, as opposed to any other form of involvement, is called for. The possible forms of government involvement include regulation, building and operating transportation systems, and incentives for private development. The examination of these questions is based on the experience of past government freight programs and projects, the committee’s review of freight policy proposals of others, and past Transportation Research Board (TRB) committees’ evaluations of government freight programs. The final section of the chapter is a summary.

GOVERNMENT RESPONSIBILITIES

Government roles in transportation are dictated primarily by historically established responsibilities that are not likely to change fundamentally in the near term (TRB 1998, 22). First, governments provide and operate certain facilities, including most major elements of freight transportation infrastructure. As described in Chapter 3, governments account for 90 percent of capital expenditures for infrastructure used for freight transportation. Second, governments impose charges (e.g., tolls) and special taxes (e.g., motor fuel taxes and aviation ticket taxes) on users, generating revenue sufficient to cover most government expenditures for the facilities.

Third, governments regulate transportation operations to reduce air pollution, casualties, noise, and other social costs of transport. Control of these costs is a motivation for public infrastructure investment, for example, in mass transit. Control of community impacts of freight transportation, especially in urban areas that are the sites of major freight terminals, has been a motivation for publicly supported freight infrastructure projects, including projects that eliminate conflicts between passenger and freight traffic and that buffer populated areas from freight traffic. Governments also regulate pricing and other business practices of transportation firms, although to a lesser extent than in past decades.

Finally, governments provide research and information necessary for the planning and management of public and private transportation facilities.

Responsibilities have evolved over time. Economic regulation has diminished, while environmental regulation has become a major influence on practices. The federal share of infrastructure spending declined after its peak in the 1970s but has been stable for the past two decades. Public–private partnerships, in which a private-sector firm provides financing and

operates a publicly owned facility, have delivered several projects in recent years. Freight industry participants, seeking to increase resources for the activities most important to them, have proposed alterations to the established government responsibilities with regard to freight infrastructure, in at least three directions: (a) expanded government responsibility for planning the development of the freight transportation system and for ensuring provision of capacity (e.g., through assistance to private-sector rail and intermodal facility development), (b) greater direct federal responsibility for setting freight infrastructure investment priorities (e.g., through a federal infrastructure bank), and (c) expanded private-sector participation in building or operating certain facilities now provided by governments (e.g., through private-sector operation of toll roads, ports, or other facilities). Chapter 5 describes proposals in these categories.

The policy issues raised by such proposals for changes in government responsibilities were the motivation for the committee's study charge. The likely consequences of proposals for major alterations to public-private or federal-state roles must be carefully evaluated. The objective of any change should be made clear, and the preferred policies should be those that meet the objective at low cost to the government and with minimal intervention in market decision making.

Rules for Determining Responsibility

The TRB *Freight Capacity* committee recommended three rules for determining the need for government involvement in a freight transportation project or function (TRB 2003, 120). First, when proposed alterations in government responsibilities are being evaluated, economic efficiency ought to be the primary criterion applied in the evaluation. That is, institutional arrangements, public investments, and operating practices of government facilities should be selected so as to yield the greatest total economic benefit. Second, expansion of government involvement beyond its established responsibilities should be limited to certain defined circumstances in which market-dictated outcomes would be far from economically efficient, specifically, restraining exercise of monopoly power and dealing with nonmarket costs of pollution, congestion, and accidents. Changes in government roles that would replace user charge revenue with tax revenue, substitute government financing for financing through the credit market, or replace private-sector investment decisions with government decisions require special scrutiny because they would exert important and possibly harmful effects on efficiency.

Third, government leadership is a practical necessity in the most complex infrastructure projects, that is, large projects in urban areas that extend through multiple government jurisdictions, that involve sensitive environmental issues, and that often involve coordinated improvements to publicly and privately owned facilities serving both passengers and freight. However, exerting leadership in these cases does not require that government subsidize the costs of providing freight facilities. If a facility is economically justified, then paying for it through user charges usually should be possible (facilities that may be exceptions to this rule, and finance options in such exceptional cases, are identified below).

Limits on Government Capabilities

When presented as general statements, the rules outlined above are mostly noncontroversial. The TRB *Freight Capacity* committee noted that they appear in federal executive agency policy statements and in legislation (TRB 2003, 120–121). Nonetheless, applying them in decisions on

government intervention has proven to be difficult in practice. One obstacle to their application is technical: public officials, experts, and industry participants have not reached a common understanding of the nature and magnitude of market failures, how to measure and evaluate them, or the practical effects of government interventions intended to correct them. However, the more important obstacle is that many infrastructure policy debates, although argued in terms of national economic efficiency, in reality are over distributional issues; that is, regional and industry interest groups seek aid and favorable treatment from government without weighing the implications for national welfare. For example, in federal programs, the focus on distributional impacts leads, at one extreme, to project earmarking that favors regions or groups with the strongest political representation, and at the other, to formula allocations of funding such that all regions or groups receive proportionate shares regardless of the relative merits of their projects. Distributional consequences inevitably have a strong influence on political decisions, but allowing freight infrastructure investment and operating decisions to be driven by these considerations depresses the return on public investment.

Because of these obstacles, government intervention can be ineffectual even when market outcomes are imperfect and a strong case exists in principle for intervention. Failures can occur when governments are unable to evaluate and predict the consequences of regulatory, spending, and tax policies and when distributional considerations take precedence over efficiency in government decisions on allocating resources.

Proposals for new kinds of public investment or for public aid to private firms generally are supported by arguments that market failures are preventing the private sector from providing freight services efficiently on its own and thus necessitate government action (Box 4-1). Alternatively, such proposals characterize the government contribution to funding for a freight project as paying for public benefits of the project, while private-sector contributions are described as paying for private benefits (Box 4-2). Because the experience of government transportation programs illustrates that the risk of unsatisfactory outcomes is real, a new intervention ought to be justified not only by a qualitative argument about market failure but also by quantitative evidence that the practically attainable benefits of the action will exceed the costs (Box 4-3).

If the obstacles to effective government action could be diminished, then the economic benefit of government's involvement in freight transportation would be increased. Required are (a) better analysis tools and cultivation of more widespread understanding of how government interventions, particularly investment decision making and facilities pricing, affect the performance of the transportation system; and (b) institutional arrangements that give system users, through the working of the freight transportation market, more influence over governments' freight facility investment and operating decisions.

FEDERAL RESPONSIBILITIES

The three subsections below are a review of the overall scope of federal responsibilities with regard to the freight transportation system, based on the conclusions of past TRB committees; a discussion of criteria for screening individual infrastructure projects to determine the need for federal assistance in programs such as the Transportation Infrastructure Finance and Innovation Act (TIFIA) or in any new federal freight assistance programs; and an examination of the relevance of the "national significance" concept in defining the federal role.

BOX 4-1

External Benefits of Freight Infrastructure Projects

The justification for public subsidy for an infrastructure project depends on an argument that the project is worth more to the public than it is to the users. Otherwise, the project could be funded with user fees and the subsidy would be unnecessary. In the projects reviewed in Chapter 3 and in the proposed new government freight programs reviewed in Chapter 5, the intended external benefits (or reductions in external costs) include the following:

- Reduction of community impacts of freight traffic, including pollution, injuries, and congestion.
- Offsetting of the effects of market distortions caused by other government actions. Among these are subsidies to trucks in the highway program, suppression of railroad profits and investment by economic regulation, state subsidies to seaports, and competition of untolled roads with toll facilities.
- Benefits related to the network character of transportation systems; that is, benefits that accrue to all users of the system when a new destination is added or access to a destination is improved (Eberts 1998, 144–145; Small 1999, 162–166).
- Other kinds of external economic development benefits, for example, from accelerating regional development or enhancing national competitiveness. Such benefits often are not clearly defined, and their significance is debatable (Eberts 1998, 138–145; Oden and Mueller 1999).
- National security, the grounds for federal actions to reduce specific security risks, for example, cargo inspections at ports. National security is also cited as justification for government provision of base capacity, for example, in the case of the federal Interstate highway program.

The TRB *Intermodal Freight* committee considered the relevance of external costs and benefits of freight transportation as warrants for government involvement in infrastructure development (TRB 1998, 30–32; Eberts 1998). The TRB *Paying Our Way* committee estimated marginal external costs of a set of hypothetical freight movements involving various commodities, distances, and transport modes (TRB 1996). These studies' findings include the following:

- Costs are sensitive to the circumstances of individual freight movements. Therefore, broadly targeted policies such as subsidies to encourage mode shifts may not be the most cost-effective.
- External costs as a percentage of the carriers' internal costs often appear to be of roughly similar order of magnitude for truck and rail for comparable trips. External costs vary greatly depending on the characteristics of the trip and are particularly high for trips that traverse urban areas, where congestion and pollution costs are high, and for trips on any facility where congestion is poorly managed (i.e., urban streets and highways and inland waterways).

(continued)

BOX 4-1 (*continued*)

- Estimates of benefits of infrastructure projects from reduced external costs of freight traffic are highly uncertain because of inadequacies of data and analysis methods.
- Analysis of alternative methods of correcting market failures is essential for determining the most beneficial public policies. In particular, subsidizing an activity to offset the distortions caused by a preexisting subsidy to another activity is unlikely to be the most cost-effective solution when regulatory or pricing options are available.

BOX 4-2

Public and Private Benefits

Proposed definitions of government responsibilities often characterize project benefits as composed of public and private components and apply this distinction in determining the appropriate division of responsibilities for paying for projects. For example, with regard to projects jointly funded by government and the private sector, it is often said that the government role is justified by the expected public benefits and that shares of project expenditures should be divided between the government and the private-sector parties in proportion to relative public and private benefits (Waterfront Coalition 2005, 19; NSTPRSC 2007, 58). This concept has been applied in legal and regulatory decisions. The U.S. Supreme Court's 1935 decision in *Nashville, Chattanooga and St. Louis Railway v. Walters* [294 U.S. 405 (1935)] established the principle that the identity of the "chief beneficiaries" of the improvement is the relevant fact in determining the reasonableness of a state law imposing a share of costs of constructing a grade separation on the railroad (Wisconsin Department of Transportation 2003). The decision argued that the chief beneficiaries of grade separations often are highway users.

In practice, it has not been possible to interpret this principle unambiguously or in a way that leads to outcomes that are economically most efficient or that would generally be perceived as fair. For example, consumers are the ultimate beneficiaries of any improvement in the efficiency of an industry, and in a competitive industry, only a small fraction of the cost savings from an efficiency improvement may be passed on to shareholders in the form of higher profits, but these facts are not seen as justifying general public subsidies of industrial investments. Similarly, the population as a whole receives health benefits from industry pollution control measures, but industries are required to undertake the initial outlays to pay for these measures. For deciding government and private-sector responsibilities in such projects, the following would be more useful distinctions:

- Benefits to commercial entities versus benefits to individuals (for example, the user benefits of a highway that serves both personal and commercial traffic). It is accepted in most settings that commercial users of transportation facilities must pay the cost of providing the

(continued)

BOX 4-2 (*continued*)

facilities to them. Because it might be more difficult to charge individuals who benefit, paying a share of the costs of projects that produce such benefits from tax revenue may be necessary. Nonetheless, most benefits of a transportation facility to individuals who use it are equally as private as are benefits to firms, and frequently can be charged for.

- Internal versus external benefits (see Box 4-1). If a project will produce benefits (for example, pollution reduction) that a private investor would not take into account when considering whether to build it (because the investor would have no way of charging the recipients of the benefit), then a government contribution that allows these benefits to be attained may be justifiable. However, subsidizing infrastructure construction may not be the cheapest means of attaining such benefits; pricing solutions (e.g., pollution or congestion charges) or regulation often will be more cost-effective.

In deciding whether the government should be involved and whether general taxpayers should contribute to the cost of the project, the relevant questions are as follows: First, do the project's benefits exceed its costs (i.e., is it economically worthwhile)? Second, would the project be constructed without government involvement? Third, could the project be funded directly by its users, through fees?

BOX 4-3

Practical Risks in Expanding Government Involvement in Freight Infrastructure

Even when market outcomes are imperfect and a case exists in principle for government intervention, experience shows that intervention can be ineffectual. Some observed problems were described in the TRB *Freight Capacity* and *Intermodal Freight* reports (TRB 2003, 100–102; TRB 1998, 33–34). The potential problems include the following:

- Distributional fairness superseding economic efficiency: Government programs face pressures for allocation of fair shares by state, region, or interest group. This pattern would be unsuitable for efficient development of large-scale freight facilities, which require concentration of resources in a small number of major nodes of the freight system. Selective intervention will tilt competition among states, ports, carriers, and shippers and generate demands for compensatory aid. Private-sector recipients of aid inevitably will be subject to a degree of political control over business decisions, which will tend to increase operating costs and reduce investment returns.
- Perverse incentives: The availability of external aid reduces sponsors' incentives for careful project selection. Local project sponsors are concerned only that constituents' benefits

(*continued*)

BOX 4-3 (*continued*)

(including income generated by the external grant) justify the local share of project costs. Availability of capital grants discourages development of operational solutions to congestion or other problems.

- Institutionalization of subsidies: Subsidies, once they are made available, tend to become routine, rather than awarded on the basis of the merit of individual cases. When subsidies begin to be commonplace in an industry, the risk of undertaking unsubsidized initiatives is increased.
- Throwing good money after bad: Political considerations encourage public officials to continue to provide funds to keep an unsuccessful project afloat, either because the project has built a constituency or to avoid admitting an error.
- Displacement of investment that would have been carried out by lower levels of government or in the private sector: For example, the General Accounting Office estimates that a \$100 increase in federal highway aid causes the states to increase total highway spending by about \$50 (GAO 2004, 21–27). To the extent that federal aid displaces state and local spending, it is equivalent to general revenue sharing rather than targeted spending on a federal priority (Gramlich 1990; Oates 1999, 1126–1130). Similarly, a federal tax incentive for private investment may have a high ratio of federal tax dollars lost to net new capital spending stimulated.
- Limits on government evaluation capabilities: Proposals for deeper government involvement in overseeing development of the transportation system assume capabilities for evaluating project costs and benefits that do not now exist in government agencies. Acquiring them would require experience, new management policies, and new personnel.
- The excess economic burden of tax funding of infrastructure investment: Raising funds through taxation imposes a cost on society through the distortions in markets that result. That is, increasing tax revenue by a dollar will reduce private consumption and investment by more than a dollar. Especially, income taxes discourage income-producing behavior (Eberts 1998, 128–129; Nadiri and Mamuneas 1998; Small 1999, 166–167). Some estimates of the magnitude of this effect are substantial, up to \$0.50 per dollar of tax. This cost must be taken into account in evaluating the net benefit of a government intervention.

These are problems that many government programs confront and are not in themselves sufficient grounds for rejecting any policy proposal. Nonetheless, in evaluating proposals for expanding the scope of government involvement, it is necessary to compare the “do nothing” alternative with the realistically likely outcome of intervention rather than with the ideal outcome.

Scope of Responsibilities

The federal government’s existing responsibilities relating to freight infrastructure provision are extensive: provision of grants to state and local governments for highway and airport construction; collection of revenue, mainly from user taxes, to fund these grant programs; direct

federal provision of the inland waterways, harbor channels, and the air traffic control system; regulation of safety and environmental impacts of transportation; economic regulation that includes oversight of rates and competition in the railroad and ocean shipping industries; border controls; general tax provisions that influence investment decisions of governments and private firms; and research and information services. These functions are carried out by the Department of Transportation (USDOT), the Department of Defense, the Department of Homeland Security, the Environmental Protection Agency, the Surface Transportation Board, and other federal agencies (Box 4-4).

Past TRB committees have pointed out that the federal government has important opportunities for contributing to better performance of the freight transportation system by improving its execution of these established functions (TRB 2003, 122–124). Federal policies that ensure efficient management of the federal grant programs and of the federally provided facilities, cost-effective environmental and economic regulation, and tax provisions that do not promote uneconomic investment decisions will be essential to satisfactory performance of the system.

Some past analyses of the problems of improving freight transportation system performance have concluded that a further need exists for a strong federal leadership role. For example, a 2008 Government Accountability Office (GAO) report on the topic argues as follows (GAO 2008, 42):

DOT and Congress, which have important oversight roles in regulating interstate commerce, should both play key roles in bringing about needed changes . . . to increase the efficiency and capacity of the nation's freight transportation system. Given the clear interstate and international character of many freight challenges, the federal government has a distinct and important role in bringing a national scope and vision to the problems that now face localities, states, and regions that have national freight flows. By promoting and coordinating solutions across jurisdictional lines, the federal government could increase the effectiveness of localities, states, and regional governments and planning organizations in overcoming their freight-related challenges. The federal government could also more effectively direct national resources towards those freight investments and solutions that have nationwide influence.

Similarly, proposals for expanding federal responsibility that the committee reviewed (described in Chapter 5) call for more active federal engagement in planning and guiding the development of the freight system through direct federal investment, through federal action to redirect state and local investment priorities in favor of projects serving freight, and through subsidies for private-sector investment.

The development of the Interstate system may be cited as an example of such an activist federal role in directing national transportation system development. However, the Interstate system was in important respects a simpler venture, and more closely related to well-established government activities and institutional arrangements, than assuming responsibility for national coordination of the multimodal freight transportation system would be. It is difficult to point to a successful federal model for such an undertaking. In most of the prominent recent federal engagements in freight infrastructure, for example, the federal contributions to the Alameda Corridor and the Heartland Corridor, the projects were conceived by the local principals, and the

federal government's role, as a provider of funds or financing assistance, was passive. The only recent major exceptions to this form of federal involvement have been projects on the directly federally provided systems (waterways and air traffic control).

BOX 4-4

Federal Government Activities Affecting Freight System Performance and Infrastructure Development

Funding Aid for Capital Expenditures

Federal-aid highway program
 Airport Improvement Program
 Freight rail assistance: Railroad Rehabilitation and Improvement Financing program; short line railroad investment tax credit

Direct Federal Construction, Maintenance, and Operation

Inland waterways system
 Air traffic control system
 Harbor channels
 Marine navigation aids

Dedicated User Fees and Taxes

Aviation: aviation excise taxes, airport passenger facility charges (federally supervised but locally imposed)
 Highway user taxes: motor fuels excise, heavy vehicle use tax, truck equipment excises
 Inland waterways fuel tax
 Harbor maintenance tax

Security and Border Controls

Transportation security operations
 Customs functions
 Border immigration controls
 Agricultural inspections

Regulation

Transportation safety
 Federal-aid highway program standards (highway design, construction, operation, and planning)
 Truck size and weight
 Vehicle emissions
 Other environmental (e.g., water pollution, hazardous materials)
 Interstate commerce (Surface Transportation Board oversight of railroad rates and competition)
 Maritime commerce (Federal Maritime Commission oversight of rates and competition of ocean common carriers and marine terminal operators)
 International trade and investment (e.g., foreign carrier cabotage restrictions)
 Antitrust
 Restrictions on fees charged by recipients of highway and airport capital grants

General Tax Provisions

Tax-exempt bond provisions
 Depreciation deduction rules

Research and Information

Bureau of the Census economic data collection
 U.S. Department of Transportation data collection
 U.S. Department of Transportation technical and policy research

The conclusions of the TRB freight committees concerning federal responsibilities are less expansive than the GAO statement and would restrict the federal role to special circumstances. The *Intermodal Freight* committee found that “federal involvement may . . . be necessary because the scale or complexity of the project puts it beyond local capabilities, the risk can be borne more efficiently at the national level, or essential federal responsibilities are involved (for example, customs)” (TRB 1998, 56). The *Freight Capacity* committee concluded that the federal government is responsible for freight infrastructure if a justification exists for government involvement and “a conflict exists between nationwide and local interests” (TRB 2003, 24). With regard to the form of federal involvement, the *Intermodal Freight* committee concluded that, even for major projects, although a “top-down” federal program, with a federal agency actively identifying and developing projects, may be necessary in a few cases, the normal model should continue to be a “bottom-up” approach in which local governments and private parties develop proposals and seek federal government participation. In these projects, the federal government would be a provider of backup credit and an absorber of risk, not a source of grants (TRB 1998, 101).

The past TRB committees urged a cautious approach to expanding federal involvement on three grounds. First, they concluded that conflicts between national and local interests in development of major freight facilities are not inevitable. Local communities normally welcome industries that produce services for a nationwide market because such industries are the essential foundation of local economies. However, communities will oppose development if they are burdened with paying the costs of freight traffic through taxpayer-provided infrastructure and through congestion and pollution spillovers. The preferable solution to this conflict is to develop mechanisms for localities to recover their costs from shippers and carriers, rather than to shift the burden to the federal government and national taxpayers (TRB 1998, 101). Second, the past committees concluded that the federal government lacks competence to displace local public-sector decision making on transportation problems and priorities and therefore that maintaining the established practice of local leadership in project development is appropriate. Finally, the committees believed that improving freight system performance will require increased reliance on market direction in investment decisions and in managing operations, and therefore that policy changes that involve expanding subsidies and increased government control of investment decisions would not lead to progress.

Within this limited scope—projects facing unusual challenges because of their scale or complexity and projects involving essential federal responsibilities—there are nonetheless important opportunities to make the federal supporting role in freight infrastructure development a more useful resource to local project sponsors and a more effective means of promoting freight transportation efficiency. The following are some of the forms that new federal interventions could take:

- Providing incentives, including funding assistance, for development of local and facility-specific revenue sources to pay for construction and operation of freight infrastructure.
- Catalyzing action at the state and local level to relieve freight mobility bottlenecks through demonstrations and challenge grants (grants awarded as part of USDOT’s National Strategy to Reduce Congestion illustrate this function).
- Revising existing federal credit assistance programs, including TIFIA and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)

private activity bond programs, to make them more attractive to project sponsors and to promote federal policy objectives.

- Monitoring and evaluation of freight system performance and diagnosis of sources of inefficiency. Both the earlier TRB freight policy committees recommended specific federal activities of this kind (TRB 2003, 127, 135–138; TRB 1998, 108–110). The USDOT Freight Performance Measurement Initiative described in Chapter 3 is an example of the kinds of monitoring required; however, as noted in Chapter 3, present efforts appear to lack priority and focus.
- Leading by example, that is, reforming finance arrangements and planning to improve performance of the existing federal-aid programs and of the federally provided facilities (inland waterways, harbor channels, the air traffic control system, and federal facilities at border crossings).
- Intervening in exceptional circumstances to resolve conflicts between local and national interests. Historical examples of federal action to resolve conflicts in the national interest include preemption of state truck weight regulations that Congress determined were an unjustified burden on interstate commerce, federal intervention in siting of marine liquefied natural gas terminals, and federal supervision of other hazardous materials transport.
- Facilitating projects that require cooperation of multiple state or local jurisdictions. Past TRB committees as well as GAO and interest groups have identified this function as an important federal responsibility. However, GAO has observed that the federal government lacks a defined policy or mechanism for aid to multijurisdictional projects. GAO cites USDOT's Corridors of the Future program, announced in 2006, as a step in the direction of developing such a capability (GAO 2008, 27–28). In that program, which has not been continued, USDOT awarded six small planning or capital grants, totaling \$63 million, to multistate coalitions that offered proposals for cooperative development of major Interstate corridors employing innovative design or operational features (USDOT 2007).

Specific actions to strengthen federal supporting activities will be proposed in Chapter 6.

Identifying Projects Requiring Federal Involvement

The study charge asks the committee to identify criteria that can be used to select projects requiring public support. As explained in Chapter 1, the committee understands the charge to refer in particular to the possible need for new or expanded federal activities to assist in freight infrastructure development and to criteria for guiding federal decisions. The preceding sections proposed principles to guide decisions about government involvement and federal involvement. This section describes practical implications of the principles for the administration of federal assistance programs.

The experience of TIFIA and the Railroad Rehabilitation and Improvement Financing (RRIF) loan program suggests that a federal program restricted to projects with primary funding from nonfederal sources and with other rigorous eligibility criteria may receive only infrequent applications. The task of federal program administrators responsible for such a program (either the existing ones or any future programs for freight that may be created) will be to avoid poorly justified projects while encouraging applications that present opportunities to demonstrate the value of federal participation in appropriate projects.

USDOT already administers at least five programs—TIFIA, RRIF, the Projects of National and Regional Significance and private activity bond programs created in the 2005 surface transportation act (SAFETEA-LU), and the Supplementary Discretionary Grants for a National Surface Transportation System provided in the 2009 economic stimulus package—that require it to evaluate and select freight projects that merit federal government assistance. The Secretary of Transportation is given the authority to approve or deny applications for aid. To manage each of these programs, as well as any programs enacted in the future, the responsible federal agencies have a need for practical criteria for evaluating proposals for federal assistance to ensure that the programs meet their goals of improving the performance of the transportation system. Each of these programs was described in Chapter 3. In summary, the programs’ evaluation criteria, as specified in legislation and USDOT implementing rules, are as follows:

- **TIFIA:** Projects may be a public highway or transit facility or a private-sector rail or intermodal terminal facility that has state or local government endorsement (that is, the application for federal assistance must be from a government agency); eligibility is restricted to projects that are large and economically important; the majority of project funding must be from facility revenue or other secure nonfederal sources; and selection is to favor projects that would be accelerated by federal assistance and projects in which federal participation would attract private-sector investment in the facility.
- **RRIF:** Any capital expenditure for infrastructure or equipment by a public or private entity, for freight or passenger service, is eligible; private parties may apply directly to USDOT for assistance. The Secretary is to give priority to projects that have safety, environmental, or economic development benefits; are endorsed in state plans; provide rail service to communities; and enhance capacity and relieve bottlenecks on the national rail system. USDOT also considers the financial soundness of projects and the consequent federal financial risk in its review of applications for RRIF or TIFIA credit assistance.
- **Projects of National and Regional Significance:** Eligible projects are to be very large (over \$500 million); certain private-sector rail projects as well as public-sector surface transportation projects would be eligible; projects must “generate national economic benefits” or “otherwise enhance the national transportation system” (SAFETEA-LU, Section 1301); and the federal investment should leverage additional funding from public and private sources (although the federal share may be up to 80 percent of project costs). This program has not been implemented because Congress earmarked all the funds authorized.
- **SAFETEA-LU private activity bonds:** A public-sector sponsor may seek authorization to issue bonds whose interest is exempt from federal income taxes to build a project developed by private parties to construct highway, rail, or intermodal transfer facilities. The project also must meet the eligibility requirements of TIFIA or of another federal transportation aid program. The bonds would be issued by the sponsoring state or local government on behalf of the private developer. The Secretary of Transportation has discretion to select the projects authorized to issue bonds within the act’s cap on the total volume of bonds (SAFETEA-LU, Section 11143). USDOT requires that applicants be prepared to issue the bonds promptly (FHWA n.d.).
- **The Supplementary Discretionary Grants for a National Surface Transportation System** provided in the American Recovery and Reinvestment Act of 2009 (Title XII, Public Law 111-5, February 13, 2009), a \$1.5 billion program in some respects similar to the SAFETEA-LU Projects of National and Regional Significance program: No restrictions are

placed on the kinds of surface transportation projects eligible; freight rail, port infrastructure, and port access projects are specifically identified, in addition to highways and transit. The funds are to be broadly distributed: no grant is to be greater than \$300 million, not more than 20 percent is to be awarded to projects in a single state, and the Secretary is to ensure “an equitable geographic distribution of funds” and a balance between urban and rural beneficiaries. Priority is to be given to projects in which a federal contribution will “complete an overall financing package,” but no state or local matching share is required (i.e., the federal share of funding for a project may be up to 100 percent). Projects that can be completed within 3 years also are to receive priority. The Secretary is to “publish criteria on which to base the competition for grants.”

A relevant comparison may be made between these U.S. federal criteria and those applied in the European Union’s (EU’s) Trans-European Transport Network (TEN-T) program, an initiative for development of major international transportation corridors. The projects in the program are the responsibilities of the EU member countries, who participated in a process organized through the EU for identifying priority projects and agreed to cooperate in their completion. The EU provides limited funding and credit assistance (Box 4-5). The criteria for awarding EU assistance to projects are similar to those of TIFIA and Projects of National and Regional Significance in the United States. A project is eligible to receive aid if it is listed in the TEN-T plan and is economically viable (that is, benefits must exceed costs) but has insufficient “financial profitability” (that is, it could not support itself from user charges) and would not receive full funding from national governments or other local sponsors because these parties lack the necessary resources or do not see the project as sufficiently beneficial to their local constituents (European Commission 2007, 56–57, 81–83). The elements missing in U.S. practice are the EU-wide long-term plan for system development and apparently greater reliance by the aid granting—agency on its own project evaluations.

The various criteria used in all these programs may be generalized into a small number of considerations. The 1998 TRB *Intermodal Freight* committee (TRB 1998, 100–101) proposed three sequential criteria for assessing the federal government’s responsibility for projects that are candidates for aid in a federal freight infrastructure assistance program:

1. Economic justification: The project would yield benefits from improved performance of the transportation system great enough to justify its costs; that is, it is of economic value from a national perspective.
2. Government responsibility: Involvement of government at some level—state, local, or federal—is justified.
3. Insufficient local capability: State and local governments are incapable or unsuited for carrying out the project unaided (or at least there is a risk that they would not be able to carry out the project successfully) because
 - The national interest differs from the local,
 - The scale of the project is beyond local capabilities, or
 - The project (or major elements) would perform essential federal functions (with regard to defense, security, customs and immigration, jurisdiction over navigable waters).

The TRB committee intended these as criteria for determining a federal interest or responsibility, not for justifying federal assumption of the major responsibility for project funding. The third

BOX 4-5

European Union TEN-T Program

The European Union's TEN-T program is an example of a process of identifying transportation projects of (in this case) continentwide significance (European Commission 2005; NEA et al. 2004; European Commission 2003; European Commission 2007). The EU designated a list of 14 priority European transport projects in 1994. They were eligible for small EU grants and for EU loans, and the member governments agreed in principle to assign priority to the projects and to coordinate their planning and construction. The list was expanded to 30 projects in 2004 after EU enlargement.

Most of the 30 projects are actually long-distance corridors with multiple individual construction projects along their lengths. They include passenger and freight facilities in all modes. The network of corridors appears more extensive than selective: corridors traverse every EU state, and every national capital is on a corridor. The goal is to complete the 14 original projects by 2010 and all 30 by 2020. The cost of completing all projects by 2020 was estimated in 2005 as €252 billion, of which about €200 billion already had been spent since 1994.

Projects were selected on the basis of recommendations of committees reporting in 1994 and 2003. The 2003 committee (on the basis of whose recommendations the project list was expanded from 14 to 30) stated its selection criteria as follows (European Commission 2003, 25):

The Group decided to work in two stages. In a first stage, the Group preselected the projects worthy of being examined in more detail, by eliminating those projects not meeting one of the following criteria:

- Being on a main trans-European axis pertinent to the internal market of the enlarged Europe, taking in particular into account projects crossing natural barriers, solving congestion problems or corresponding to missing links.
- Having a European dimension in particular by meeting a threshold of €500 million for infrastructure.
- The existence of evidence showing potential economic viability, other socioeconomic benefits (e.g. social, environmental), and firm commitments from the concerned Member States to carry out the required impact assessments with a view to completing the project within an agreed timeframe.

In a second stage, the Group selected the priority projects with respect to the three following qualitative criteria:

- The European value added of the project, in terms of importance for facilitating exchanges between Member States, for instance improving interconnections and interoperability between national networks.
- The strengthening of cohesion, either by better incorporating the future

(continued)

BOX 4-5 (*continued*)

- Member States into an enlarged Europe, or by connecting the main peripheral areas and the least developed regions to the rest of Europe.
- The contribution to the sustainable development of transport while tackling the problems of safety and of environmental protection and by promoting modal transfer.

The criteria of the 1994 committee (that recommended the original 14 projects) differed from those of the 2003 committee in some points. In particular, the 1994 criteria specified that projects had to allow for the possibility of private financing and that the program was to “avoid the public financing of infrastructure which would lead to distortions of competition contrary to the common interest” (European Commission 2003, 26–27). The 2003 criteria do not mention these two economic requirements, but the 2003 committee stated that they are implicit in the terms of the program.

“European value added,” referred to in the 2003 criteria, appears to be the European equivalent of the concept of “national significance” used in U.S. policy discussions. The criterion is qualitative; that is, there has been no attempt to estimate quantitative differences in benefits from the European and national perspectives.

In addition to evaluations performed by the responsible national governments, each project has been evaluated for the European Commission according to multiple criteria, on the basis of standard scenarios concerning future economic and transportation developments. The evaluations are to be updated periodically and presumably will influence future revisions of the program.

TEN-T also provides examples of policies of a central agency (the EU) to coordinate infrastructure development across borders. The EU has made only small contributions to the projects and has limited ability to induce the member states to set priorities or coordinate development according to the TEN-T plan. Projects are eligible for grants of up to 50 percent of costs for preparatory studies and up to 10 percent for construction (and up to 20 percent for cross-border segments of projects). EU grants through 2004 were €5 billion (out of about €200 billion spent). In addition, €50 billion in loans from the European Investment Bank had been committed to TEN-T projects through 2004. Much of the EU influence appears to be via persuasion, for example, by seeking public commitments to the program from the member states, publishing periodic reviews of progress on the projects, and urging member states to cooperate on cross-border projects.

A project is eligible to receive aid if it is economically viable (that is, benefits must exceed costs) but insufficiently “financially profitable” (that is, it could not support itself from user charges) and would not receive full funding from national governments and other local sponsors because these parties lack the necessary resources or do not see the project as sufficiently beneficial to their local constituents. A 2007 evaluation of experience with the original 14 TEN-T projects concluded that projects that received EU funding aid were meeting the economic viability standard, according to postcompletion assessments of project segments in operation, but that the impact of the funding aid on the projects was unclear. The study

(*continued*)

BOX 4-5 (continued)

concluded that as many as 45 out of 50 project segments (pieces of the 14 large corridor projects) that received EU aid probably would have been built, if sometimes in modified form, without the aid, but that EU assistance in some cases speeded commencement and completion of projects and influenced project design. The evaluation concluded that “for many projects . . . there is no real financial need for the Community funding” but that contribution from the EU “gives a significant impetus to the decision making and [places] the project higher on the political agenda” (European Commission 2007, 57).

section of this chapter describes the range of forms of federal intervention that may be used to help solve freight mobility problems.

Applying each of the three criteria listed above would become successively more dependent on the judgment of the federal program administrators rather than quantitative criteria, as outlined below.

Economic Justification

The first criterion, the economic value of the project, can be estimated with accepted methods. The administrative practices of the federal agency responsible for the assistance program will determine whether economic evaluations are credible for directing program decisions. Experience suggests that the following practices are necessary to ensure useful evaluations:

- Standardized requirements should be imposed for conducting evaluations to demonstrate economic justification. For example, in all its projects, the U.S. Army Corps of Engineers applies a standard evaluation method, the *Principles and Guidelines*, which defines national economic development and environmental quality as the objectives of federal water projects and defines how these two measures are to be estimated in project evaluations (USACE 1983; NRC 2001, 19–28). The 1994 Executive Order “Principles for Federal Infrastructure Investments” states general requirements for evaluations (Executive Office of the President 1994). Standard evaluation methods are essential for quality control and for comparability of competing proposals.
- The federal agency must have the ability to verify sponsors’ project evaluations. Project sponsors normally would be required to prepare evaluations (following federal standards). The federal review should verify sponsors’ estimates of traffic, project construction and operating costs, and shipper cost savings and other benefits.
- Retrospective reviews should be conducted to determine whether proposal evaluation methods are reliable. Program rules can require aid recipients to conduct the retrospective evaluations, but they would require federal verification for credibility. USDOT now is required to submit periodic reports to Congress on the TIFIA program (USDOT 2006). The reports contain information on the financial performance of projects receiving TIFIA assistance, but no quantitative information about the realized benefits of TIFIA-aided projects. The EU administration of the TEN-T program has attempted to evaluate actual benefits of completed projects receiving EU aid. Although the review found that “the selection process resulted in the

selection of projects that are economically viable,” the conclusion is weakened by lack of data for many projects (European Commission 2007, 72, 82).

- Evaluations and supporting material should be public and subject to independent review (that is, transparent).

Any freight-related project that passes the economic justification test might be reasonably described as nationally significant, regardless of whether the benefits are cost reductions to shippers and carriers or reductions in external costs of freight transportation. However, according to the 2003 TRB committee’s criteria, these nationally significant projects must pass the two subsequent tests before federal involvement can be justified.

Government Responsibility

The principles stated in the first section of this chapter for determining the need for government involvement can be reduced to objective criteria. Most projects seeking federal assistance will be to construct facilities on the existing publicly owned systems: highways, ports, harbors, inland waterways, and airports. The government responsibility in these is evident.

The more difficult cases for federal program administrators to evaluate will be projects that would involve public participation in construction of freight rail lines or other infrastructure normally provided by the private sector. These should not be common because nearly all projects that pass the economic viability test ought to be conducted by the private-sector owners of these systems. Assessments of proposals in a federal assistance program should be guided by a predefined list of specific exceptions to this rule. The most important category on the list would be projects in which mitigation of harmful community impacts of freight traffic was a major objective.

The examples described in Chapter 3 show that projects in this category are prominent. They include the Alameda Corridor, CREATE, Reno ReTRAC, and Alameda East projects. In some of these projects, community impact mitigation is the primary motivation; others have dual objectives of mitigation and improved freight mobility. Governments have been prominently involved in finance arrangements and in promotion of these projects. The examples also show that governments have devised a variety of arrangements for carrying out community impact mitigation projects and that public assumption of the costs of mitigation is not the only option. The section below on interventions for community impact mitigation describes alternative solutions to the problem.

Insufficient Local Capabilities

According to the three criteria stated above, the federal government’s role in supporting freight infrastructure development is residual: its responsibility is for those projects that have high economic value and yet cannot be completed by the private sector or by state and local governments acting alone. The third criterion—whether local parties lack capacity to carry out a project—is the test whose application must depend most on the judgment of the federal administrators and the experience of past projects.

Under the federal structure of government transportation programs in the United States, the advantages of aligning responsibilities for transportation system development are recognized so that facilities are provided and operated by the lowest level of government (federal, state, or

local) competent to do so. Obstacles to mobility, even on the national systems, generally are local bottlenecks, most spillover effects are local, and local leadership is essential in political decisions on the design of solutions (TRB 2006, 19–21). Therefore, given limited federal resources and the desirability of state and local governments taking responsibility for all projects within their competences, administrators must determine how to screen out projects that probably would be successfully completed without federal aid.

The *Freight Capacity* committee's criteria above give three circumstances in which state and local governments may be unable or unsuited to carry out a project alone: where a project fulfills essential federal responsibilities, where a conflict exists between local and national interests, and where the scale of a project is beyond local resources. Examples of projects related to essential federal responsibilities are installations required at ports and border crossings for security or regulatory processing. As the earlier TRB committees observed, the federal responsibility to participate in the resolution of problems arising from border controls does not imply that taxpayers, rather than the users of border and port facilities, should pay for solutions. With regard to the problem of potential conflicts between local and national interests, the recommendation of the earlier TRB committees was that federal policy should aim to reduce these conflicts by supporting development of mechanisms for localities to recover their costs from shippers and carriers, rather than to shift the burden of these costs to the federal government and national taxpayers. Nonetheless, in any federal program to assist development of freight-related projects, it is likely that a large share of applications will be for projects in which community impact mitigation is a major component. Alternatives for paying for community impact mitigation projects are considered later in this chapter.

Existing federal assistance programs attempt to identify projects whose scale justifies federal assistance by setting a minimum size limit on eligible projects. Presumably because Congress judged the original limits too restrictive, the minimums have been lowered in revisions of TIFIA and RRIF. The question of whether the scale of the project exceeds local capacity must also depend on the judgment of program administrators, who must take into account a range of factors that relate to the complexity of completing a project in addition to dollar cost. Features of projects that would figure prominently in decisions on whether federal participation was required include the following:

- The construction cost of the project with respect to the infrastructure budgets of the principal parties.
- Institutional complexity, as indicated by the numbers of jurisdictions and private-sector firms that must participate in or acquiesce in the project. Projects requiring multistate cooperation appear to be a category in which federal facilitation could be valuable; however, as noted above, no established federal mechanism exists for fostering multistate cooperation in transportation projects.
 - The likely availability and cost of financing in the private credit market.
 - Eligibility for funding through established federal, state, or local finance arrangements (lack of available funding may be grounds for special federal involvement).
 - The need for extensive upfront planning, coordination, and seed funding. (Federal assistance in these activities may be especially valuable in launching difficult projects.)
 - Project risks related to the novelty of organizational or technological solutions proposed. (High-risk but high-return projects may be an appropriate niche for federal assistance.)

- Domestic competitive considerations. (Federal program administrators would have to consider explicitly whether federal assistance to a project would unjustifiably favor one region, port, or group of private firms over economic rivals.)

The underlying criterion is that the federal government should participate only when its involvement would allow completion of an economically valuable project that otherwise would not go forward, or its involvement would speed project completion, lower costs, or otherwise substantially increase the likelihood of success.

The USDOT administrative organization for review of TIFIA applications is an appropriate arrangement for making these decisions within a federal executive agency: the process involves broad consultation, negotiation with the sponsors, and approval at the highest executive level of the agency. (See Figure 3-2 in Chapter 3.) Alternative administrative arrangements have been proposed (as described in Chapter 5), including creation of an independent public entity with authority to choose projects receiving assistance.

Internal assessments of both the TIFIA program in the United States and the TEN-T program in Europe have attempted to judge whether aid has been effectively targeted to projects that are beyond the capabilities of the local principal parties. The most recent USDOT report to Congress on the TIFIA program does not contain any project-by-project analysis of whether the federal assistance was necessary for the assisted projects to proceed. It concludes that “several more years must pass before the Department can assess the program’s actual long-term costs and benefits” (USDOT 2006, 8) but that the program “especially benefits a clearly defined niche of project financings—user-backed start-up projects lacking prior market access, where investors must absorb construction risk, performance risk, and demand risk. For these projects, which under the best of circumstances would achieve a senior debt rating not better than the lowest investment grade category, the TIFIA program seems to be filling a market gap by offering attractively priced subordinate and supplemental capital” (USDOT 2006, 9). In other words, USDOT sees the primary impact of TIFIA as lowering the cost of projects and thereby perhaps ensuring or accelerating completion.

A 2007 evaluation of experience with the original 14 TEN-T projects concluded that the impact of external aid on the projects was unclear. The study found that as many as 45 out of 50 project segments (pieces of the 14 large corridor projects) that received EU aid probably would have been built, if sometimes in modified form, without the aid, but that EU assistance in some cases speeded commencement and completion of projects and influenced project design. The evaluation concluded that “for many projects . . . there is no real financial need for the Community funding” but that a contribution from the EU “gives a significant impetus to the decision making and [places] the project higher on the political agenda” (European Commission 2007, 57).

Summary: Identifying Projects Requiring Federal Involvement

Major freight infrastructure projects are diverse with respect to the physical and operational characteristics of the capacity problems to be overcome, institutional settings, and feasible finance arrangements. Therefore, a federal assistance program intended for such projects must be flexible and structured to consider proposed projects on a case-by-case basis. Projects can be evaluated economically according to standard methods, but formulating simple rules for assessing the need for and value of federal involvement in any individual project will not be

practical. Decisions on the scope and form of federal assistance therefore will depend on the judgment of program administrators. Nonetheless, certain features of projects can be identified that are likely to figure prominently in all decisions on federal participation. These features relate to project size, institutional complexity, the likely availability and cost of financing in the private credit market, and special federal responsibilities.

Effective federal management of a freight infrastructure assistance program will require stronger central evaluation capabilities and definition of standard economic evaluation methods. Federal decision making must be transparent and consistent. Even though some evaluation criteria will be qualitative (for example, the assessment of the likelihood that the project could be conducted with local resources alone), they should be defined in such a way as to make clear that certain kinds of projects will be excluded from federal assistance. Some decisions of managers of a federal program may be contentious, particularly those that entail concentrating federal resources in the small number of locations where the most significant freight bottlenecks occur.

A federal assistance program should itself be guided by clearly defined and measurable goals. They should include using the influence of the federal government to promote sound long-term finance and planning practices in state and local government infrastructure projects and achieving completion of economically valuable projects that would not have been carried out or would have been substantially delayed without federal participation. Periodic retrospective evaluations of the performance of federal assistance programs should be carried out, which assess the economic value of completed projects that received assistance and the programs' success in meeting other defined goals.

Projects of National Significance

The study charge asks the committee to assess the applicability of a criterion indicating national significance for selecting freight infrastructure projects for public investment. The basis of the study charge, as well as of legislation referring to projects of national significance such as SAFETEA-LU's Section 1301 (establishing a grant program for projects of national and regional significance) and policy statements of USDOT and others over the past two decades referring to projects of national significance, is the premise that projects in this category constitute an important portion of transportation infrastructure investment needs, that there is a backlog of such projects, and that new projects will become necessary as traffic increases in coming decades. The conception of these projects is that they are large (in comparison with typical transportation infrastructure project costs of past decades), are discrete, usually involve improvements of multiple modes of transportation serving both passengers and freight, usually are located in urban areas and involve multiple government jurisdictions and private entities, have requirements that do not match existing funding programs and institutional arrangements, and are unlikely to be completed without federal leadership or support. In federal legislation and in policy proposals, the term "project of national significance" (or "project of national and regional significance") always has been used to designate projects that are worthy of federal support because they possess these characteristics (see Box 4-6).

BOX 4-6

Projects of National Significance: Past Uses and Definitions

The TRB *Intermodal Freight* committee cited uses of the term “project of national significance” in the 1990s to designate a category of freight project that merited federal assistance. The 1994 report of the National Commission on Intermodal Transportation recommended that “Congress should provide special funding annually to support some number of intermodal projects that are truly of national or regional significance” and that “such projects should be eligible for supplemental funds from the Federal government due to their national significance.” USDOT’s 1996 National Freight Transportation Policy Statement declared that “Federal participation may be appropriate when infrastructure investment projects have a national or regional significance” (TRB 1998, 54–61). In the TIFIA credit assistance program, one of the criteria by which USDOT is to judge applications is “the extent to which the project is nationally or regionally significant, in terms of generating economic benefits, supporting international commerce, or otherwise enhancing the national transportation system” (Transportation Equity Act for the 21st Century, Section 1503).

More recently, the primary criteria for funding eligibility in the Projects of National and Regional Significance (Section 1301) federal-aid program category created in SAFETEA-LU are that the project “generate national economic benefits,” “reduce congestion, including impacts on the State, region and Nation,” or “otherwise enhance the national transportation system.” The “Findings” introducing Section 1301 state as follows: “Current levels of investment are insufficient to fund critical high-cost infrastructure facilities that address critical national economic and transportation needs.” Comments submitted in response to a USDOT rulemaking on evaluation of proposals under this program (71FR41748, July 24, 2006) suggest related definitions of national significance as a rating criterion. For example, the I-95 Corridor Coalition proposes that “a highly recommended [for Projects of National and Regional Significance funding] freight and/or passenger project should address transportation needs and connectivity at an international trade gateway or domestic trade hub; along a national trade, commerce, or military corridor; or along a multistate regional trade, commerce, or military corridor” (I-95 Coalition 2007, 4).

The American Association of State Highway and Transportation Officials (AASHTO) Board of Directors used a related concept as one of the “funding and financing principles” of its 2007 recommendations to the National Surface Transportation Policy and Revenue Study Commission. AASHTO recommended that “the Federal government should be responsible for the ‘national’ benefits share of investment resulting from trade agreements, international ports, border crossings, major national freight gateways, and substantial security requirements mandated for freight facilities” (AASHTO, *Transportation—Invest in Our Future: Surface Transportation Policy Recommendations*, March 2007, p. 90). In other words, it was proposed that a nationally significant share of each project can be determined and that this share should determine funding responsibilities.

Although in each of these uses “national significance” is a warrant for federal involvement, the 1998 TRB committee’s definition emphasized that federal involvement might

(continued)

BOX 4-6 (*continued*)

not be essential in many such projects: “A project of national significance may be defined as a freight project that has important consequences for the performance of the nationwide freight system. State and local governments often carry out such projects without need of federal leadership. A project of national significance that entails a federal responsibility is one for which government involvement is justified and that state and local governments are unable or unsuited to carry out because the national interest differs from the local, because of the scale of the project, or because essential federal responsibilities are involved (e.g., customs)” (TRB 1998, 100–101). This two-part definition first defines a project of national significance in a functional sense (as a project whose impact on freight mobility propagates through the nationwide transportation system) and then states additional criteria for determining which such projects entail a federal responsibility.

The most frequently cited examples of such projects are the Alameda Corridor and CREATE, for example in the report of the National Surface Transportation Policy and Revenue Study Commission (NSTPRSC 2007, 19). Certainly other projects of similar complexity have been carried out and will continue to be needed. However, it is striking that 9 years earlier, the same two projects were used by the TRB *Intermodal Freight* committee to illustrate the concept (Smith 1998, 200–202). As Chapter 3 described, only two TIFIA loans to primarily freight-related projects and two RRIF loans exceeding \$50 million to freight rail infrastructure projects have been awarded in the decade since these programs were created with the intent of institutionalizing the kind of federal assistance given to the Alameda Corridor. Lists of major freight projects (or of freight bottlenecks requiring capital solutions) for particular regions or modes have been drawn up [for example, the California Goods Movement Action Plan (Business, Transportation, and Housing Agency and California Environmental Protection Agency 2007), the I-95 Corridor Coalition’s Mid-Atlantic Rail Operations Study (I-95 Coalition 2002), and USDOT’s highway freight bottlenecks inventory (Cambridge Systematics 2005)], but no recognized national list of the highest-priority project needs exists. Thus the objective of programs intended to promote projects of national significance remains poorly defined, and it is conceivable that the kinds of projects to which the term commonly has been applied may not be as numerous or as great a share of freight investment needs as they were at one time thought to be.

The case study projects in Chapter 3 and the other major projects cited in this report illustrate that large projects are being carried out today by governments and the private sector with the institutional structures and finance arrangements that are now available. The megaproject model exemplified by the Alameda Corridor and CREATE does not correspond to the most typical pattern of development of infrastructure systems. State highway agencies and railroads develop long-term corridor improvement plans that are composed of numerous projects staged over a period of decades. Each individual improvement produces benefits, and the plan can be altered over time as traffic and available funding change. By this means, state and local governments and private firms routinely construct transportation facilities, often with federal assistance but without any primary federal role, that serve national markets and affect system performance over a wide geographic area. The federal government has little involvement

beyond regulation in the development of the other nationwide infrastructure networks—telecommunications and electric power.

The criteria outlined in the preceding subsection are sufficient for determining the need for federal involvement. They do not depend on any definition of national significance beyond the requirement that a project be economically justified. National significance, as the term has generally been used in federal laws and in the transportation policy statements of various organizations, is not a definitive criterion for deciding which transportation projects merit extraordinary federal support or involvement. Indeed, any substantial freight transportation infrastructure project that is expected to yield benefits is significant to the national economy. The federal role is a residual one: a project merits federal assistance if it is of high economic value and would not be accomplished by the state and local governments and the private sector acting alone. The recommendations presented in Chapter 6 propose methods of applying this rule.

FORMS OF INTERVENTION

The first two sections of this chapter argued that government involvement in infrastructure projects is justified where the government responsibility has been established by practice (e.g., highways), where market outcomes would be unsatisfactory because nonmarket costs are important, and where the private sector cannot act alone in complex institutional settings. Federal action is called for when government participation is needed and state and local authorities are incapable of resolving the transportation problem unaided. Proponents of new publicly supported freight infrastructure projects generally cite these same grounds as justification. For example, public support of rail and waterways projects is proposed as a means to induce a shift of traffic from truck to modes with lower environmental costs, and to offset market distortions caused by truck subsidies in the highway program and by the depression of rail investment incentives caused by economic regulation (AAR 2007).

However, building or paying for infrastructure seldom is the only option for fulfilling the government responsibility in these circumstances. Regulation, taxation, and pricing can mitigate problems of pollution and congestion. Public-private cooperation to resolve a mobility problem does not require shifting of cost burdens for commercial facilities to the public. Once the determination is made that government involvement is required, it is necessary to search for the most cost-effective means of intervention.

Regulatory and Pricing Alternatives

The states and the federal government could largely eliminate subsidies for intercity trucking and inland waterways by adjusting user fees and taxes (registration and permit fees, tolls, and fuel taxes). If truck and waterway transportation is receiving a subsidy because the fees and special taxes that operators pay are less than the cost to governments of providing facilities to them, then the railroads will not build some capacity that would be economically beneficial (i.e., the cost savings to shippers and to government transportation agencies would exceed the cost of building and operating it) because competition from the subsidized alternative modes prevents the railroads from charging rates that would make the investment attractive. Adjusting user charges on the competing government-operated modes so that the revenues they generate more closely

match government agency costs of providing facilities would improve transportation efficiency and increase the incentive for private-sector rail capacity investment.

The most recent federal highway cost allocation study found that user fees and taxes paid by operators of combination trucks (the principal freight-carrying vehicles) equal 80 percent of the highway agency expenditures attributed to this class of vehicle (USDOT 1997, Table ES-5). In spite of some arbitrary assumptions employed in allocating costs among vehicle classes, the federal study estimates indicate the order of magnitude of the average truck subsidy in the highway program. However, for trucks loaded to the legal weight limit, the underpayment is greater, and the implicit subsidy to trucks operating on the most congested highways probably is much higher than the USDOT study average estimate. The TRB *Fuel Tax* committee concluded that adjusting truck user charges to better reflect costs would yield important benefits from improved highway system performance, as well as redressing a truck–rail competitive imbalance (TRB 2006, 164–166).

The present structure of highway user fees and taxes does not take into account the costs of congestion, pollution, and accidents caused by truck traffic. However, the TRB *Paying Our Way* committee concluded that, as a percentage of freight rates, these costs appear to be of similar magnitude for truck and for rail long-distance freight traffic, and therefore failure to charge for them may not greatly distort truck–rail competition (TRB 1996, 96–97).

Railroads also argue that rate regulation (or the possibility of partial reregulation, for which bills periodically are introduced in Congress), by reducing revenue, suppresses railroad investment below the optimum level. [Although changes in federal law greatly curtailed economic regulation of railroads after 1980, the federal government, through the Surface Transportation Board, retains oversight of rail rates to prevent railroads from exercising monopoly pricing power in markets where competition is weak. Railroad mergers are also subject to review. Since deregulation, disputes between the railroads and their customers have led to proposals for legislation that would increase shipper protections (TRB 2003, 31–32).] Attempting to offset the effect of regulation on rail revenue by means of rail investment subsidies would be unlikely to lead to efficient development of the freight system. The net effect of a government policy of protecting shippers by depressing freight rates through regulation, and then subsidizing railroads as an incentive to provide capacity to serve shippers, would be to shift responsibility for paying for capacity from shippers to taxpayers. The consequence would be that railroads would have less information about which capacity increases shippers would be willing to pay for and therefore less ability to direct investments to the most valuable improvements. Adjusting the regulatory policies that are the cause of the problem would be the preferable solution, since this reform would restore appropriate market incentives as the guiding force for investment decisions. The railroads have made proposals with regard to regulatory changes that they believe are called for (e.g., allowing product and geographic competition to be considered in Surface Transportation Board reviews of the reasonableness of railroad rates) and have indicated which proposed tightenings of regulation they believe would be detrimental to performance (AAR 2008a, AAR 2008b).

Government subsidies to the users of freight facilities or to private-sector providers of facilities, even when used to correct a genuine market imbalance, risk harm to transportation system efficiency. Subsidies to waterways or railroads to offset subsidies to trucks can result in overconsumption of all the modes of transportation; that is, the value of the service to some shippers will be less than the cost of providing it. Subsidies, once they are made available, tend to become routine and institutionalized, rather than awarded on the basis of the merit of

individual cases. When subsidies begin to be commonplace in an industry, the risk of undertaking unsubsidized initiatives is increased. For example, if a state provides subsidies to its ports, competition will discourage ports in neighboring states from undertaking capital improvements funded by user charges (TRB 2003, 35–36). Similarly, if some railroad capital improvements are granted subsidies, then the risk to a railroad of undertaking an unsubsidized improvement has increased, since it may be undercut by a competitor who develops a service with help from a subsidy. Indeed, after the federal grant to construct the Heartland Corridor rail project (described in Chapter 3) was awarded, a competing railroad proposed partial public funding for improvements on routes parallel to the corridor (Watson 2008). The railroads themselves recognize the risk that acceptance of government subsidies could have the effect that partial deregulation would gain political favor as a reciprocal measure (AAR 2007).

Chapter 1 noted that freight capacity became a prominent policy concern beginning in the 1990s in part because of bottlenecks at ports and intermodal hubs caused by the rapid growth of international trade. Because of the U.S. merchandise trade deficit, capacity requirements at ports and other facilities serving international merchandise trade have been dictated primarily by import traffic volume. Subsidizing freight infrastructure therefore in effect subsidizes imports and may increase the merchandise trade deficit.

In cases where a subsidy to a freight service provided by the private sector is judged to be necessary, alternatives to a lump-sum capital grant should be considered, for example, a pay-for-performance agreement that would give the recipient a continuing incentive for operating and investment decisions that delivered public benefits. Such agreements are used in the public transit industry (Hensher and Wallis 2005). When a privately owned facility is built with the aid of an up-front government grant, the government bears the full risk that the hoped-for public benefits will not be realized.

Interventions for Community Impact Mitigation

The motivations for several of the most significant recent and proposed public freight infrastructure projects have been to reduce adverse community impacts as much as to add physical capacity to the freight network. The growing volume of freight traffic in port cities and in hub cities like Chicago conflicts with local traffic and imposes congestion and pollution costs on residents. Reducing these impacts or compensating communities for them will be necessary to allow freight traffic to grow, because communities eventually will halt growth through the political process if the costs are too great. One way to manage local freight traffic impacts is by pricing; congestion pricing on highways is a well-known example. However, local governments do not have authority in all circumstances to impose charges on carriers or to regulate their traffic. If freight trains are creating road congestion at railroad–highway grade crossings, the state and local governments have limited authority to require the railroad to alter its operations or to pay for an overpass (Wisconsin Department of Transportation 2003). The government’s options are to pay for a capital improvement to mitigate the impact (e.g., a grade separation) or to pay the railroad to undertake some other mitigation.

In circumstances where the government cannot legally or practically impose the cost burden on the carrier, it may be reasonable for the government to pay the cost of mitigation. An example is the Reno ReTRAC project described in Chapter 3. In that case, the City of Reno had no authority to require the railroad to pay for mitigating the impacts of train traffic through the city, so it paid for most of the project with a dedicated city sales tax and other local taxes. As the

consequence of state and federal laws and court decisions, today most costs of construction of rail–highway grade separations are paid by government rather than by railroads.

Projects such as ReTRAC are not equivalent to subsidies for rail operation; that is, they do not necessarily tend to promote overuse of rail services or overinvestment in railroads. If the value of rail service on the Reno tracks to the railroad and its customers had been less than the cost of mitigation, then the city could have paid the railroad to change its operations rather than build the mitigation project. As long as the government and the railroad can negotiate, the low-cost solution to the problem is likely to be found.

However, there is no general rule, considering either efficiency or actual practice, that the cost burden of mitigating community impacts of traffic cannot be placed on the users of the transportation facility or on the private-sector operators of the facility (whose revenue derives from the users). Whenever new facilities or major expansions of existing facilities are to be constructed, the operator of the facility normally will be required to pay for mitigation features. An example is the proposed expansion of the Intermodal Container Transfer Facility in Los Angeles (described in Annex 3-2), where the railroad has incorporated mitigation features, including a buffer zone, in the project design. The Clean Truck Program at the Ports of Los Angeles and Long Beach (described in Chapter 3) is a capital project paid for in part by fees on shippers for the purpose of community impact mitigation. Routinely, regulations require transportation operators to pay for pollution mitigation features in the design and operation of facilities and equipment (e.g., vehicle emission controls and runoff controls). Similarly, construction of highway noise barriers is funded from highway user fee revenue rather than by the local communities requiring protection. In none of these examples do the operators or users of the transportation facility directly benefit from the mitigation measure, but nonetheless they (and their customers) bear responsibility for paying for it.

In practice, cost sharing in projects like grade crossing separations is determined by negotiation between the interested public and private parties. If shippers and carriers can be induced through negotiations to pay for mitigation (as a condition of continuing the freight service that gives rise to the adverse community impact), this outcome will not be detrimental to efficient freight system development. Moreover, a legal requirement for carriers or shippers to pay for mitigation (e.g., a noise regulation) will not be detrimental to efficiency provided the cost of the required mitigation is justified by its benefit to the community and the law allows employment of the most cost-effective solutions.

In cases where legal, equitable, or practical considerations prevent government from imposing the cost burden on shippers or carriers, it may be in the public interest for the government to pay for mitigation. Government payment for mitigation will be consistent with economic efficiency provided that the government considers cost-effective mitigation options, which might include reimbursing carriers or shippers for altering their operations rather than building an infrastructure solution. As long as the cost of the mitigation measures is less than their benefit to the community and less than the value of maintaining service on the freight facility, the outcome will be in the public interest.

The risk of an unfavorable negotiated outcome is greater if funding for mitigation is available from the federal government, because the external grant relieves the local parties of the necessity of considering all the costs and benefits of alternative resolutions. If the federal government pays a share of costs, then it becomes responsible for the objective and quantitative assessment of the costs and benefits of the alternatives.

In summary, the burden of paying for freight-related infrastructure improvements should be assigned in a way that promotes economically efficient development and operation of the transportation system. The surest way to meet this objective would be to fund improvements with revenue from charges paid by users of the facilities constructed, although practical constraints will prevent this solution in some cases. If construction of a freight facility cannot be paid for by user charges because the facility would compete with a subsidized facility, the preferable solution is to eliminate the subsidy on the competing facility rather than to subsidize the new facility. If legal or practical constraints prevent governments from imposing charges on carriers or shippers to pay for community impact mitigation, government funding of such projects may be justifiable, following objective evaluation of all mitigation options. However, numerous precedents exist for requiring transportation system users to pay for impact mitigation, and such requirements are consistent with economically efficient development of the system.

SUMMARY

Government roles in freight infrastructure development are dictated mainly by their historically established responsibilities, which are extensive and are unlikely to be greatly altered in the near future. Most policy proposals with regard to freight infrastructure development involve incremental changes in government roles: either greater or less involvement in some aspect of the industry. The most significant changes in recent proposals would be an expansion of direct federal responsibility for funding and selecting highway and nonhighway freight infrastructure projects, government participation in funding and selecting freight rail infrastructure projects, and concessions for private operation of facilities that are now publicly owned (in particular, highways, ports, or airports).

Major changes in government roles would entail risks, and therefore such proposals should be approached with caution and evaluated carefully. Chapter 3 described how inefficient operation and failure to target investments to projects with the highest returns have been recurring problems in public programs that build and operate infrastructure. Changes in government roles that involve increased subsidies to freight traffic or that would replace market-driven investment decision making with government decisions would be vulnerable to these risks.

Governments have an essential role in overcoming institutional and political obstacles to needed infrastructure development and in controlling environmental costs of development. Governments require more effective instruments for carrying out these responsibilities than are now available. Ways to strengthen these instruments are proposed in Chapter 6.

The federal role in freight infrastructure development has been, appropriately, limited and supplementary. A project merits federal assistance if it is of high economic value and would not be accomplished by the state and local governments and the private sector acting alone. If this rule is followed, then “national significance” is not a necessary or useful criterion for determining federal responsibility. USDOT already has considerable experience in choosing projects for federal participation, and Congress has legislated general criteria to guide these decisions. USDOT capabilities could be strengthened by measures that will be proposed in Chapter 6.

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Abbreviations

AAR	Association of American Railroads
FHWA	Federal Highway Administration
GAO	General Accounting Office; Government Accountability Office
NRC	National Research Council
NSTPRSC	National Surface Transportation Policy and Revenue Study Commission
TRB	Transportation Research Board
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation

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Review of Finance Reform Proposals

This chapter reviews selected prominent proposals for creating new arrangements to pay for major freight transportation infrastructure projects. The proposals originate with the private sector, government, and independent sources and are responses to the concerns described in Chapter 2 about the course of development of transportation infrastructure. Several are for new federal initiatives to be included in the expected reauthorization of the federal surface transportation assistance program, the largest federal transportation spending program. The periodic reauthorizations of the surface transportation program (most recently in 1991, 1998, and 2005) have become the focus of debate over the federal role in freight infrastructure. Most of the recent proposals are similar to ones discussed before the past three reauthorizations (Lauver 1998; TRB 2003, 35–64; GAO 2003).

The review serves two purposes related to the committee's charge. First, it shows the range of options available or likely to gain serious consideration; after more than 15 years of debate of these issues [i.e., since enactment of the Intermodal Surface Transportation Efficiency Act (ISTEA) in 1991], it seems unlikely that entirely new ideas are going to emerge. Second, the features in the proposals indicate the evaluation issues that lawmakers, administrators, and interest groups will need to consider when their support for such proposals is sought.

The first section below describes the scope of the policies that a comprehensive finance reform package would address, that is, the set of related decisions about paying for and managing infrastructure that ideally would be made together. This framework will be helpful in comparing the diverse set of proposals reviewed. The second section categorizes and briefly summarizes the types of proposals. The final section identifies criteria for evaluating the proposals. The annex contains more specific descriptions of individual proposals.

SCOPE OF FINANCE REFORM

As Chapter 1 noted, the earlier Transportation Research Board (TRB) committees that studied freight capacity and highway finance viewed finance arrangements as an inseparable component of the process of planning, developing, and managing infrastructure. Therefore the committees defined finance policy options broadly, to encompass not only sources of funds but also the related functions of project selection, budgeting, pricing, operations, and governance. The *Fuel Tax* committee concluded that a complete definition of a reform package for transportation infrastructure finance in the public sector would specify these elements (TRB 2006, 121–123):

1. Defined goals, that is, a statement of what the reform is intended to accomplish, with reference to overall transportation policy goals. Evaluation of alternative reforms would entail comparison of the goals of the alternatives as well as judgments as to whether each option would be successful in reaching its goals.
2. Assignment of responsibilities for providing and paying for infrastructure among the federal, state, and local governments and the private sector.

3. Rules for determining user fees, pricing, the magnitude of subsidies, and where the burden of subsidies falls.
4. Rules on budget and project selection decision making and on disposition of revenues generated by the facilities.
5. A transition strategy: A fundamental change in finance arrangements for a major part of the infrastructure would require preparation through planning, public communication, and possibly trial applications.

On the basis of present practices and recent finance reform proposals, it is possible to outline the range of options for government roles and arrangements with regard to funding sources and project decision making (i.e., Elements 2, 3, and 4 in the list above) that will require consideration. As noted in Chapter 4, most policy proposals concerning freight infrastructure development involve only incremental changes in the historically established government roles, in particular, expansion of direct federal responsibility for funding and selecting highway and nonhighway freight infrastructure projects, government participation in funding and selecting freight rail infrastructure projects, and concessions for private operation of facilities that are now publicly owned. At the federal level, the choices for deciding on the scope and form of involvement in finance arrangements for freight projects are the following:

- Federal participation may be through direct provision of facilities or indirectly through assistance to the states, local governments, or private firms. Assistance may be in the form of grants, loans with favorable terms, loan guarantees, or tax subsidies (e.g., authority to issue tax-exempt bonds or targeted investment tax credits). The greatest quantity of federal commitments today is in the form of grants (e.g., in the federal-aid highway program). The facilities directly funded, constructed, and operated by the federal government are the inland waterways, the air traffic control system, and harbor channels and navigation aids. [In the case of a directly federally provided facility, the air traffic control system of the Federal Aviation Administration, Jasper (1991) reviews advantages and disadvantages of organizational and finance options, including organizing air traffic control as a public corporation or as a corporation with nongovernment ownership.]
- If the form of federal involvement is funding or credit assistance, alternatives for the organization of the program must be considered. The choices concerning the means of distributing assistance are formula allocation (e.g., as most federal highway aid is distributed to the states), a competitive process [e.g., as Transportation Infrastructure Finance and Innovation Act (TIFIA) loans and certain transit assistance funds are awarded], or earmarking (i.e., legislative designation of specific projects to receive assistance). Formula allocation gives greatest discretion to the states, while competitive grants entail direct federal involvement in project selection (as does legislative earmarking). With the major exception of highway projects receiving assistance through the regular federal-aid highway program, most large federal grants for freight have been for projects individually designated by Congress. Efforts to institute more formal procedures (that is, competitive or formula grants awarded according to set administrative procedures) for grants targeted to freight have had only limited success. [For example, the TIFIA and Railroad Rehabilitation and Improvement Financing (RRIF) federal credit assistance programs have not been heavily used for freight projects, and the authorized funding for the Projects of National and Regional Significance program of the Safe, Accountable, Flexible,

Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) was entirely earmarked.]

- Other choices in the design of a federal assistance program may decisively influence its outcomes. Conventional federal grants and tax incentives have been subject to criticism for failing to maximize the leverage of the federal dollars applied (i.e., the total amount of new investment per dollar of federal assistance). Alternative structures have been proposed to increase federal leverage, for example, challenge grants, or grant programs in which the total of federal outlays is controlled by reducing the federal matching share (without reducing the size of the federal program) so that any recipient can always increase the federal funds it receives by expanding the size of its own capital program. Also, some proposals would create a new entity (e.g., a government-owned corporation) to administer federal participation in freight infrastructure development, as a means to foster independence and flexibility, rather than housing the activity in the U.S. Department of Transportation (USDOT).
- Finally, sources of funds for federal assistance and direct expenditures must be specified. Three kinds of sources are available. For a directly federally provided facility, funding may wholly or partially depend on revenue from fees paid by users of the facility. For grants, the source may be an arrangement such as the federal Highway Trust Fund, which pools revenue from special excise taxes paid by users; revenue from dedicated taxes unrelated to use; or appropriations from general government revenue. The trust fund mechanism is intended to ensure that spending on a particular activity is dependent on the revenue from a particular source. Tax incentives that reduce recipients' federal income tax obligations are in effect grants derived from general revenue.

At the state and local government levels, the same questions must be considered in designing finance options: whether the government should be involved, whether it should directly provide and pay for facilities or stimulate action through aid to other parties, what rules should govern grant programs, and whether to rely on user fees or on other sources of funds. However, the range of options that has been put into practice is broader than at the federal level. State and local governments directly provide many kinds of transportation facilities, so the choice of public versus private ownership and operation (or of conversion from one form to the other) is becoming a prominent consideration in finance decisions. State and local governments are beginning to experiment with true public-private partnerships that entail enforceable, ongoing mutual commitments by the parties [e.g., the 2006 Indiana Toll Road concession agreement (FHWA n.d.)].

The best choices among these options depend on the goals of the finance reform. Legislation often states goals only in general terms, but provisions of the finance arrangements in present infrastructure programs apparently were selected to promote particular policy goals, for example, in the federal surface transportation programs, to complete specific projects that would not otherwise be built (i.e., an earmarked grant), to increase total national spending on a category of infrastructure (e.g., expressways through the Interstate highway program), to redirect the spending priorities of the grant recipients (e.g., through categorical grants, design standards, and planning requirements), to shift the burden of paying for a facility from its users or from state and local taxpayers to a broader base, or to promote certain organizational arrangements or management practices (e.g., incentives or rules regarding planning, public-private partnerships, or toll roads). The dedicated user taxes that fund the federal surface transportation program also are structured to promote policy goals; for example, large trucks pay special fees that small

vehicles do not pay in order to align tax payments with cost responsibilities. Chapter 1 explained that a premise of this study is that the primary goal of finance reform should be to improve the performance of the transportation system, taking into account not only revenue adequacy but also the influence of finance arrangements on investment decisions and on the behavior of users. That is, finance arrangements should promote efficient development and operation of the freight system.

REFORM PROPOSALS

Each of the diverse collection of finance reform proposals that the committee reviewed is incomplete in some way, addressing only certain aspects of overall finance arrangements. Some refer only to a particular freight mode and most refer only to federal programs. Therefore the proposals are not readily classifiable according to a simple functional scheme; however, they may be grouped as follows according to the provisions that each proposal highlights:

- Creation of a new federal-aid program for freight;
- Creation of an independent national infrastructure finance authority;
- Federally tax-advantaged borrowing to accelerate investment;
- Federal assistance to private-sector railroad and terminal operators;
- Development of new local or project-specific revenue sources and institutions responsible for finance; and
- Adjustments to the federal-aid highway program, including changes in grant matching rules to increase the leverage of federal aid and changes in truck fees.

The concepts of each of these categories are described below. Annex 5-1 outlines the features of specific recent proposals in each of the categories.

In the period before enactment of the 2005 federal surface transportation assistance program (SAFETEA-LU), several groups, including USDOT (2001), GAO (2003), and TRB (2003), reviewed the variety of proposals for freight-related provisions that had been published in anticipation of reauthorization of the program. The classification schemes that the General Accounting Office (GAO) and USDOT developed serve as a summary of the scope of the proposals. GAO (2003, 67–72) examined freight program proposals from the American Association of State Highway and Transportation Officials (AASHTO), the Association of American Railroads, the American Trucking Associations, the American Road and Transportation Builders Association (ARTBA), the Association of Metropolitan Planning Organizations, and the Bush administration reauthorization proposal. USDOT summarized policy recommendations of workshop participants, including public officials and executives from the finance and transportation industries. Their classification schemes are shown in Box 5-1. Both collections of proposals concentrate on two kinds of provisions: new sources of revenue (or sources of credit) and new arrangements for planning and decision making on project selection.

BOX 5-1

Classification Schemes for Federal Freight Policy Proposals*GAO (2003)*

GAO summarized seven proposals for federal freight transportation assistance programs according to how each addressed three elements of planning strategy and three elements of finance strategy:

- Elements of planning strategy:
 - Coordination across jurisdictions and transportation modes;
 - Involvement of the private sector: carriers and shippers; and
 - Data and planning tools.
- Elements of financing strategy:
 - Expanded eligibility for freight projects within existing programs (e.g., increased funding for existing programs useful for freight projects, including TIFIA and infrastructure banks; eligibility rules that direct funding to freight projects),
 - Alternative finance (new ways to raise funds, facilitate borrowing, or stimulate spending, such as tax incentives for private investment or infrastructure banks), and
 - Nonbuild tools (application of new technology to improve traffic management and reduce congestion, thus reducing the cost of providing capacity to serve traffic growth; highway congestion pricing).

USDOT (2001)

USDOT's 2001 Financing Freight Transportation Improvements Workshop summarized finance-related federal policy proposals by grouping them in three categories:

- Institutional structures and planning frameworks (e.g., a national infrastructure board, multistate regional infrastructure banks, a designated national freight system),
- Expanded eligibility for freight projects in existing programs (e.g., Highway Trust Fund aid to rail and maritime projects, a new intermodal project funding category), and
- New funding sources and mechanisms (e.g., a federal freight trust fund, government aid for investment in privately owned facilities).

In the GAO and USDOT summaries, it is striking that no mention of facility pricing occurs, except in the Bush administration reauthorization proposal summarized by GAO. Also, few proposals in these two earlier summaries envisioned any significant increase in the private-sector role in provision or operation of infrastructure. Some of the more recent proposals described below devote more attention to these two aspects of finance. All of the proposals reviewed in these earlier reports, as well as most of those summarized below, mainly concern

federal programs; however, the scope of the committee's study charge is not limited to federal finance arrangements.

New Federal-Aid Program for Freight

These proposals would create an independent federal-aid program to provide grants and possibly credit assistance to freight infrastructure projects exclusively, with features modeled after both the federal-aid highway program and federal transit programs. The program would be established with its own independent trust fund that received revenue from new dedicated taxes imposed on freight system users and possibly from other sources. A variant would be to create a new funding category within the present surface transportation aid program, drawing funds from the Highway Trust Fund. The examples described in Annex 5-1 are the Critical Commerce Corridors proposal of ARTBA and the federal freight trust fund proposal of the Coalition for America's Gateways and Trade Corridors. The National Surface Transportation Policy and Revenue Study Commission's (NSTPRSC's) recommended Program to Enhance U.S. Global Competitiveness, also summarized in the annex, is similar in some elements.

The key elements of these proposals are (a) creation of a new federal revenue source, ostensibly use-related and dedicated to freight projects; (b) project selection at the federal level through competitive grants and possibly following a federally developed national freight plan specifying priority corridors; and (c) expansion of direct federal assistance to freight railroads and other nonhighway infrastructure. The proposals are not specific on the nature of new funding sources or on whether the federal government would also originate projects under the new program. The proposals seek primarily to increase public funds directed to freight infrastructure and would shift a share of responsibility for investment decisions from state and local governments (and possibly from the private sector) to the federal government.

Earlier proposals of this kind were reviewed by the TRB *Intermodal Freight and Freight Capacity* committees (TRB 1998, 51; TRB 2003, 128–129). The TRB *Freight Capacity* committee reviewed proposals for new trust funds for port access projects and for harbor dredging. These were more limited than the more recent trust fund proposals; however, the earlier committee's assessment is relevant to the recent proposals. The committee noted that the user fee–trust fund mechanism has performed well as a means of sustaining the highway program but that the trust fund mechanism is less suitable for funding major freight facilities like seaports than for funding highways. A primary function of the federal Highway Trust Fund has been to redistribute revenue from the high-traffic components of the highway system, which generate high revenue, to spending on components that generate relatively low revenue. The justifications offered for such redistribution in the highway program do not apply to major discrete freight facilities like seaports. No technical obstacle hinders direct charging of the users of most freight facilities. Improving the efficiency of the nationwide freight transportation system will require concentrating investments at the large and heavily used facilities and those that have the greatest revenue potential, rather than diverting revenues generated by these facilities to subsidize maintenance and improvements at facilities that lack sufficient traffic to be self-supporting from user charges (TRB 2003, 37–38). A practical advantage of the user fee–trust fund mechanism that would be relevant in a freight program is that it provides stable and predictable revenue, facilitating planning.

A further practical difficulty in assessing the freight trust fund proposals is the lack of specific definition of the intended products of the spending. The Highway Trust Fund had

physical objectives (above all, the map of the planned Interstate highway system) when enacted that were concrete and easily understood by the public and legislators and that provided a basis for estimating revenue requirements. The NSTPRSC proposal acknowledges this difficulty by providing for a national freight plan to be developed and for an administrative procedure to determine the user fees and taxes needed to fund the plan. Enacting funding for a large investment program without a well-developed plan for using the funds would entail a risk; moreover, the planning and evaluation capabilities that such an undertaking would require do not exist at the federal level today.

National Infrastructure Authority

Several recent proposals have called for creation of an independent, federally sponsored authority empowered to make grants or loans to support infrastructure projects, according to selection criteria that it would administer. Freight transportation facilities would be among the broad classes of eligible facilities defined in the proposals. The proposals cited in Annex 5-1 are the National Investment Corporation recommended in 2005 by the nongovernmental Commission on Public Infrastructure and two bills introduced in Congress in 2007 that would create bodies with similar structure but more limited scope. The NSTPRSC proposal for a National Surface Transportation Commission, which would oversee federal transportation user tax rates, also is described in the annex. Proponents sometimes refer to the independent entity as a national infrastructure bank, although the entity would constitute a bank in the conventional sense only if it were structured as a self-sustaining, seed-funded revolving fund as opposed to a grant and credit assistance program.

The infrastructure authority proposals are motivated by two objectives. First, they seek to rationalize and depoliticize decision making in public infrastructure investment programs, creating an objective process in place of current practices such as earmarking and formula allocation of funds, which are seen as inefficient. The proposed new institutional structure would at the same time tend to expand federal control over infrastructure spending. Second, in some versions of the proposal, it is presented as a mechanism to increase access of government infrastructure projects to financing through the private-sector credit market. The national authority would leverage an initial capitalization from the federal government by selling bonds to investors, backed by the revenue to be received from its borrowers (Schwartz 2008).

The recent proposals for a national infrastructure authority succeed earlier versions over the past two decades. For example, the 1993 report of the congressionally chartered Commission to Promote Investment in America's Infrastructure called for the federal government to establish and capitalize a National Infrastructure Corporation to provide credit assistance to state and local governments to promote infrastructure investment. The corporation would purchase bonds issued by state and local governments to finance infrastructure projects. The bonds sold to the corporation would be subordinate to the debt sold to the public, thus reducing the interest rate at which the senior bonds could be sold. The corporation and a sister organization, the Infrastructure Insurance Company, also would insure infrastructure bonds and development risks. The corporation would securitize the bonds it purchased and sell these securities to the public.

The Congressional Budget Office (CBO) analyzed the 1993 proposal and raised questions about whether the National Infrastructure Corporation would have any significant

advantage over more straightforward forms of federal assistance (CBO 1994). CBO concluded as follows:

- The municipal bond market is for the most part a well-functioning credit market. That is, interest rates appear to be consistent with the risks and other costs of the projects being financed. One of the rationales for the National Infrastructure Corporation proposal was the existence of market failures in the municipal bond market that hinder access or increase borrowing costs for government infrastructure projects. Of course, both the National Infrastructure Corporation proposal and the CBO assessment envisioned normal economic circumstances and not conditions such as the financial crisis that began in 2008, which disrupted all credit markets.
- The net effect of the National Infrastructure Corporation would be equivalent to a federal subsidy to local governments for infrastructure spending. The subsidy would be in the form of the transfer of risk from the local governments to the federally capitalized corporation, reducing local governments' borrowing costs.
- The subsidy would increase investment in public infrastructure, but there would be no guarantee that the increase would improve public welfare because mechanisms for ensuring that public infrastructure investment is directed to the most economically productive uses are weak.
- The National Infrastructure Corporation would have no economic advantage over a program of direct credit guarantees or loans issued by a federal agency (as the TIFIA program, created later, now functions).
- The National Infrastructure Corporation also was presented as a mechanism to promote user fees. CBO found that “achievement of some of the commission’s general goals—encouraging user fees to finance infrastructure projects and requiring state and local governments to pay a larger portion of the costs of federally assisted projects—could improve the allocation of resources. But policymakers could achieve those goals more simply by modifying existing grant programs or by reforming policies for pricing the use of existing infrastructure. There is little evidence that diverting funds to the [National Infrastructure Corporation and Infrastructure Insurance Company] from alternative private investment or current federal grants for state and local infrastructure would produce more benefits for society.”
- The cost of the program to taxpayers would depend on how the National Infrastructure Corporation was organized: “Organizing the [National Infrastructure Corporation] as either an on-budget agency or a finance company would have fewer risks than establishing the corporation as a government-sponsored enterprise (GSE). If the [National Infrastructure Corporation] was organized as a GSE, the federal budget would not measure, and policymakers could not directly control, the subsidies provided by the implicit federal guarantee of its obligations. Those subsidies would be relatively large because the corporation’s business prospects would be uncertain” (CBO 1994, xi–xii).

The CBO review did not comment directly on the goal of depoliticizing public-sector infrastructure investment and fee decisions, which is an element of most of the national infrastructure authority proposals. It is reasonable to ask whether removing such decisions from the direct responsibilities of elected officials is politically practical (Orski 2008) or desirable from the standpoint of public accountability.

Federally Tax-Advantaged Borrowing to Accelerate Investment

In proposals published by AASHTO in 2003 and 2007 and in bills introduced in Congress in 2005 and 2007, the federal government would make a special issue of tax credit bonds, with the proceeds devoted to transportation infrastructure and distributed either through the existing federal surface transportation assistance programs or through a competitive grant program for major projects. The justification for the borrowing would be that there is a backlog of work that must be addressed rapidly. The 2003 proposal may also have been seen as a way to allow an increase in the size of the federal-aid program while postponing resolution of the debate over increasing federal user tax rates.

A tax credit bond is a bond that pays all or part of its interest in the form of credits against the holder's federal income tax liability. In some uses that have been proposed for these instruments for infrastructure finance, the cost of borrowing to the issuer of the bonds is eliminated; all costs are borne by the federal government in the form of tax revenue forgone. From the standpoint of the aid recipient, authority to issue tax credit bonds is equivalent to a federal grant whose value equals the discounted present value of the interest payments that the recipient avoids over the term of the bond. If the Treasury were not compensated from future user tax revenues, then the tax credit bonds would represent a contribution from the general fund to the federal surface transportation program (now funded almost entirely by user taxes). Therefore tax credit bonds are appropriate where a grant is intended and, in the interests of transparency, should be identified as such. The bonds would cost the federal government more than ordinary grants of the same value to recipients because they would pay a slightly higher interest rate than Treasury bonds (CBO 2004, 3).

Assistance to Private-Sector Freight Railroads and Terminal Operators

Annex 5-1 summarizes proposals for federal assistance to private freight railroads or to private firms constructing intermodal facilities, including a rail investment tax credit and proposals for institutionalized access to federal grants for rail projects. Government assistance to freight railroads has been available, including state aid programs; loans from the federal RRIF program; and grants from the federal Congestion Mitigation and Air Quality program. Proposals to allow states to assist rail projects with a portion of the funds they receive from the major ongoing federal surface transportation assistance grant programs have been considered periodically since the federal surface transportation assistance act of 1991 (ISTEA) but never enacted. The American Recovery and Reinvestment Act of 2009 (Public Law 111-5, February 13, 2009) made private-sector freight rail projects eligible to receive aid through the \$29 billion special surface transportation discretionary grant program enacted as part of the economic stimulus package. The proposal for a rail investment tax credit is favored by the railroads because it would entail fewer government controls than grant funding on where and how investments are made and by highway advocates because this form of aid would not affect highway funding.

The railroads have made two economic arguments to justify the tax incentive. First, their competitors in the trucking industry are subsidized because the various fees and special taxes they pay are less than the cost that highway agencies incur in providing and maintaining highways for them. Trucking subsidies suppress rail rates and cause the railroads to lose some business to trucking for which the railroads would be in reality the low-cost provider. Second, rate regulation by the Surface Transportation Board and, more significantly, the political threat

of heavier regulation if the railroads were to exercise their market power to increase profitability suppress rates and prevent the railroads from earning the returns that would justify investments for expanding capacity (AAR 2007).

Estimates of the magnitude of trucking subsidies through the highway program by the Federal Highway Administration (FHWA 1997) and TRB (TRB 1996) indicate that they are significant. The argument that these subsidies justify aid to railroads is equivalent to the argument that paying for rail capacity would be cheaper for the government than building the highway capacity that would be necessary to carry expected freight volumes by truck. Rail capacity can be cheaper only if governments are undercharging trucks. The TRB *Freight Capacity* committee examined these arguments (TRB 2003, 82–85) and concluded that subsidizing rail construction would be an inefficient means of correcting distortions in the freight market. The result could be excess consumption of both truck and rail services, and the government would have no basis for gauging the optimum size of the rail subsidy. The 2003 committee observed that governments could ensure that the market outcomes of competition between trucking and other modes are in the public interest by adjusting truck user fees so that revenues cover the cost of providing highways for trucks. The 2003 committee also observed that, although external costs (of pollution, congestion, and accidents) per ton-mile are lower for rail than for truck freight, external costs as a fraction of freight rates appear to be roughly similar for the two modes, and therefore failure to internalize all such costs may not greatly affect the competitive balance between the modes.

A 2008 study of competitive conditions in the rail industry commissioned by the Surface Transportation Board concurs with the railroads' arguments that the threat of tighter regulation suppresses railroad rates (Laurits R. Christensen Associates 2008, ES-26). The resulting reduction in profits would be expected to reduce railroad investment. However, a more straightforward alternative to subsidies as a means of offsetting this effect would be regulatory changes that allowed railroads greater rate-setting freedom and removed uncertainty over federal policy. The railroads have proposed regulatory actions for these purposes (AAR 2008a; AAR 2008b). If rail capacity expansion is economically justified and railroads could pay for expansion from revenue from customers, it is unlikely that a public benefit could be gained by shifting the cost burden of the expansion from the customers to the public. Shippers' groups have argued that lack of competition in certain freight markets served by rail has allowed the railroads to charge rates that shippers regard as unreasonable and have proposed legislation to tighten federal regulatory oversight of railroad rates, competitive practices, and mergers (English 2007; Hecker 2007). The possibility exists, in particular circumstances, that a railroad with a monopoly in a freight market niche will underinvest to maximize its profits. Rate regulation can ameliorate these special situations without creating a need for subsidies.

New Local or Project-Specific Revenue Sources and Finance Arrangements

Included in this category are proposals to increase reliance on revenue from facility-specific, cost-based fees to pay for publicly provided infrastructure. Examples of this finance arrangement are toll highways and the Alameda Corridor, which charges per container and per railcar fees to its users. Another form of local, facility-specific finance arrangement raises revenue from a source not paid by freight facility users, for example, the local sales tax dedicated to the Reno ReTRAC project described in Chapter 4, which pays for a project that mitigates the community impact of rail traffic.

Many publicly owned facilities charge per use fees today (examples are turnpike tolls, airport landing fees, wharfage and dockage fees charged by seaports, and mass transit fares). Also, rent payments that port and airport authorities receive from their commercial tenants are derived from the per use charges that the tenants' customers pay. Other public facilities (e.g., the inland waterways, the air traffic control system, and port channels) charge no such fees. Per use fees (or their equivalent) are a major source of funds at most major seaports and airports, but they provide a minority of funds for highways and none for the federally provided systems. Most public transportation facilities today receive important shares of their funds from general tax revenue or from the revenue of special taxes imposed on users (for example, highway motor fuel taxes and the federal aviation passenger ticket tax) that is dedicated to spending on specified classes of facilities and pooled into central funds for national or statewide redistribution. Historically, these arrangements have been favored because tolls or other forms of facility charges were seen as technically impractical and because redistribution has been one of the political objectives of public works programs. Because fuel taxes and similar charges can be, at best, only weakly related to the costs of providing service to individual users, they are an inadequate mechanism for managing use or for guiding investment decisions.

The TRB *Freight Capacity* committee considered the various arguments that have been put forth for pooled funding and for subsidizing construction of individual facilities (TRB 2003, 37–38, 82–85, 132–135). It concluded, as noted above, that the rationale for pooled funding that applied historically for highways is not applicable to freight facilities and that most freight facilities ought to be able to pay for themselves. The committee noted that a government responsibility to provide facilities or leadership in developing a project does not necessarily justify paying for the project with tax revenue. It argued that the important benefits of most freight transportation–related capital projects are the reduced cost of transporting the goods that are carried on the facility constructed, and therefore, in most instances, if such a project cannot not be paid for through user fees, its benefits will not be adequate to justify the investment (TRB 2003, 120).

The examples of this category cited in the annex are a proposal for creation of regional corridor authorities in California with revenue-raising powers to coordinate freight capacity development, proposals for expansion of highway tolling and for imposition of mileage charges on road users, and proposals for greater reliance on user fee funding of the freight infrastructure facilities that are directly provided by the federal government: harbor channels, inland waterways, and air traffic control.

User fees are imposed by the owner of the facility. Therefore, expansion of these kinds of revenue sources would tend to diminish dependence on federal funds and on the federally operated user fee–trust fund arrangements. However, the federal government could have a role in promoting and assisting in the development of local and project-specific revenue sources through financial incentives or technical assistance.

Adjustments to the Federal-Aid Highway Program

Two kinds of proposals examined by the earlier TRB committees that could increase the effectiveness of the federal-aid highway program are adjustments to the schedule of federal highway user taxes paid by large trucks and reduction of the federal matching share in federal-aid highway projects. Reducing the federal matching share in each project, without reducing the total amount of federal aid disbursed, would increase the federal-aid program's leverage to

induce additional state spending on highways. Adjusting truck taxes could reduce subsidies that distort truck–rail competition, thereby stimulating increased private-sector rail investment and obviating any need for subsidies to rail and intermodal projects, and could reduce highway agency construction costs. The annex describes these proposals.

CRITERIA FOR EVALUATING FINANCE OPTIONS

As Chapter 1 noted, the earlier TRB transportation infrastructure committees considered the problem of comparing and evaluating alternative finance arrangements. The TRB *Fuel Tax* committee analyzed a series of state and federal study commission reports on transportation finance to identify the evaluation criteria that officials most often cite as important, and it listed its own criteria (TRB 2006, 11–18, 64–68). The TRB *Intermodal Freight* committee laid out a step-by-step checklist for deciding on the scope and form of public-sector participation in freight projects (TRB 1998, 38–44). Ideal rules for finance decisions in the public interest are not difficult to compose; however, reform is challenging because finance-related decisions are necessarily political and are dictated by the incentives and motives of the active participants in the political process. Reform will entail changing these incentives to align them more closely with the public interest.

The national infrastructure authority proposals described in Annex 5-1 would attempt to overcome this challenge by calling on Congress to depoliticize investment and finance decisions in ceding them to an independent entity. Although Congress has taken analogous actions in the past (for example, in creation of the Federal Reserve Board to isolate monetary policy from immediate political pressures), public works spending is such a central function of legislatures that it seems likely that they would hesitate to withdraw from those decisions to such an extent. However, in more modest ways, legislatures have already delegated control of certain public works decisions to grant recipients or to program administrators. For example, in the federal-aid highway program, the formula allocations to states and the division of funding into program categories allow Congress to set broad policy but leave project selection to lower levels of government. At the state level, the highway construction program is a political decision but is influenced by objective input (e.g., pavement management systems used to guide resurfacing programs), in part as a consequence of federal requirements for transparent decision making.

The committee's charge calls on it to evaluate alternative finance strategies to assess how they would serve the public interest. This section identifies criteria that an evaluation of the proposals described above should apply. The criteria can be organized according to the five elements of a complete finance reform package listed at the beginning of this chapter: (a) defined goals; (b) the assignment of responsibilities among governments and the private sector; (c) rules for determining user fees, pricing, and subsidies, and who should pay subsidies; (d) rules on who selects projects and controls project revenues; and (e) a transition strategy to establish the new finance arrangement. There are significant differences among the proposals in each of these elements. The problem that designers of a reform package face is to decide how to specify each of the elements: what goals should be sought, how responsibilities should be assigned, what rules should govern pricing and project selection, and how to make the transition to the new arrangement. Table 5-1 summarizes how the designers of the proposals summarized in this chapter appear to have answered these questions.

As Chapter 1 explained, the normative criterion the committee has applied is that finance arrangements should be designed to improve freight system performance by promoting efficient investment decisions and operations. The five criteria listed above are descriptive of the key elements of finance arrangements; the task for designers of new finance arrangements is to specify each of these elements so as to satisfy the ultimate criterion of improved system performance.

Goals of the Reform Package

The TRB *Fuel Tax* committee, describing highway finance reform proposals, noted:

The diversity of reform proposals reflects different points of view on how the underlying problems of transportation finance should be defined. The proposals all recognize, to some extent, dual goals of finance policy: to assemble a collection of revenue flows adequate to support a desired level of spending and to establish practices that promote investment in high-return projects and efficient operation of existing facilities. The starting point of proposals from government sources and transportation interest groups tends to be spending needs (generally seen as greater than present revenues can support). Proposals from academia and other independent sources tend to emphasize the importance of finance practices that provide incentives for better spending and operating decisions and usually avoid judgments on the proper levels of revenue and taxes. (TRB 2006, 121)

This diversity of goals is evident in the proposals described in Annex 5-1. For example, among the proposals that entail creation of an independent authority with responsibilities for infrastructure, the primary goal of the Center for Strategic and International Studies (CSIS) version is to rationalize decision making. The bills introduced in Congress that incorporate a version of this proposal dilute the features of the original that were intended to further this goal and introduce provisions intended to ensure that the effect of enactment would be to increase infrastructure spending. Thus to evaluate the range of proposals, it is necessary first to make a judgment about which goals are appropriate.

Appropriately, one of the first concerns of public administrators responsible for transportation programs is revenue adequacy. However, as Chapter 2 argued, finance alternatives must also be evaluated in terms of their impacts on the performance of the transportation system. Finance arrangements exert an important influence on decisions about which projects are constructed and on how existing facilities are utilized. Through these connections with investment decision making and with operations, changes in finance arrangements affect transportation system performance. Table 5-2 compares the policy proposals described in this chapter according to how they might be rated on this economic efficiency criterion. In general, a proposed reform in freight finance arrangements can be expected to encourage more efficient investment decisions and operations if it were to derive revenue for capital expenditures and operation from users, bring charges more in line with the costs attributable to each use of facilities, constrain investment decisions by user fee revenues, minimize expansion of direct government influence over private-sector decisions, and strengthen capabilities and incentives for objective economic evaluation of projects conducted by operating agencies.

TABLE 5-1 Summary of Finance Reform Proposal Features

Proposal	Goals	Division of Responsibilities: Federal/State/Local, Private	Sources of Funds: User Fees, Pricing, Subsidies	Decision-Making Rules: Procedures for Project Selection and Budgets
New federal-aid program for freight	<ul style="list-style-type: none"> • Increase public freight infrastructure spending. • Increase user fee revenue. • Provide predictability and stability in funding. 	<ul style="list-style-type: none"> • Stronger federal role in directing development and in funding. (Most projects remain locally or privately sponsored.) • Possibly new government role influencing private-sector investment. 	<ul style="list-style-type: none"> • Federal share of projects funded by new system-level user fees or taxes and possibly partially from general fund. • Fees not differentiated by facility used or costs occasioned. 	<ul style="list-style-type: none"> • Projects proposed by states or private sector; federal government selects projects to receive aid. • Possibly some projects federally initiated.
National infrastructure authority	<ul style="list-style-type: none"> • Rationalize and depoliticize investment decisions. • Expand access to private capital through federally capitalized bank. 	<ul style="list-style-type: none"> • New independent federal entity empowered to make grants and loans and possibly to borrow. • Stronger federal role in directing development and in funding. 	<ul style="list-style-type: none"> • Primary reliance on credit assistance promotes user fee funding. • Some versions would also provide grants from federal general fund. 	<ul style="list-style-type: none"> • Professional staff of independent entity evaluates projects on criterion of national economic benefit. • Possibly incentives for projects with user charges, pricing for demand management.
Federally tax-advantaged borrowing to accelerate investment	Allow completion of a backlog of high-value projects while postponing increase in user tax rates.	Federal funding increase implies stronger federal role.	Federal general fund. In some versions, cost to Treasury would be reimbursed from future federal highway user fee revenue.	Added funding would flow through established aid programs (i.e., no change in procedures); or, in some versions, new federal entity would be created to direct use of funds.
Federal assistance to private-sector rail and terminal operators (investment tax credits or grants)	Increase capital spending of freight railroads and intermodal terminals to offset trucking subsidies and reduce external costs of freight.	<ul style="list-style-type: none"> • Private firms decide uses, subject to federal agency review for consistency with uses allowed in federal law. • New federal influence on private-sector investment decisions. 	Federal general fund.	Private firms select investments on the basis of expected returns and eligibility for federal assistance.
New local or project-specific revenue sources (e.g., road tolling and pricing; port infrastructure fees; revised harbor, waterway fees; regional corridor authorities)	<ul style="list-style-type: none"> • Provide new revenue sources for investment. • Increase reliance on market forces and on local decision making to direct investment. 	Local institutions levying fees would have greater responsibility and authority.	Fees depending on use and on costs occasioned would be main revenue source.	Institutions levying fees would control revenues, possibly with formal input from fee payers.
Adjustments to the federal-aid highway program: reduced federal share; truck fee adjustment	<ul style="list-style-type: none"> • Increase federal leverage to stimulate state and local spending. • Improve efficiency of highway use. 	Share of funds from state and local sources increases but federal influence over state and local spending levels increases.	As in present federal-aid highway program, except implicit subsidies from underpayment of user fees reduced.	As in present federal-aid highway program, except state and local governments receive partial federal match for every capital dollar spent.

Assignment of Responsibilities

Among the six categories of proposals listed above (a federal-aid program for freight, a national infrastructure authority, acceleration of spending through federally subsidized borrowing, federal assistance to private-sector freight facilities, development of new local or project-specific revenue-raising capacities, and adjustments in the federal-aid highway program), most proposals in the first four envision major new federal commitments, possibly including substantial taxpayer subsidies. The fifth category, development of new local or project-specific revenue-raising capacities, includes proposals that could proceed if major new federal assistance does not materialize.

TRB's *Intermodal Freight* committee noted that local governments are willing to provide infrastructure support for industries of national significance if the local community can capture a large enough portion of the national benefits of the activity in the form of income to local residents and tax and user fee revenue to local government (TRB 1998, 56). The committee concluded that "local decisions can be expected to harmonize with national interests . . . if state and local governments have mechanisms for recouping costs of publicly provided facilities through user fees, means are available to compensate parties that bear the spillover costs of development projects, and local governments are not induced by the availability of external aid to undertake uneconomic projects. Federal policy should seek to bring about these conditions" (TRB 1998, 101).

Proposals have been made for federal actions that would aim to promote local self-sufficiency in this way. Federal support for development of improved forms of road user charges, as in the proposal of the TRB *Fuel Tax* committee described above, would be one such action. Another example is a series of proposals published by the Brookings Institution that call for devolution of decision making and revenue responsibilities in surface transportation, but with federal engagement to realign authority in favor of local governments (Boarnet and Haughwout 2000; Robins and Strauss-Wieder 2006). The federal government would provide financial incentives for states to transform metropolitan planning organizations into regional infrastructure authorities with taxation, programming, and spending power. Ultimately, in the proposal, regionally levied user fees would replace most federal aid.

Rules for Fees, Pricing, and Subsidies

The practice of collecting fees from users to pay for government-supplied transportation facilities and services is generally accepted and is applied in most transportation modes. However, as the TRB *Fuel Tax* committee noted, "governments generally have respected the user fee finance principle because it is seen as practical and fair. Explicit consideration of how changes in user fees and other funding arrangements will affect transportation system performance or the economic benefits derived from transportation programs seldom enters into . . . fee decisions" (TRB 2006, 68). That committee and the other TRB committees that studied surface transportation finance, as well as the committees on aviation industry policy, all concluded that fees and other revenue alternatives should be compared on the basis of their effects on transportation system efficiency. They recommended programs of systematic evaluation to observe the impacts of fees on the behavior of system users, on investment decisions, and on the costs and benefits of transportation programs.

TABLE 5-2 Possible Effects of Proposed Finance Reforms on Investment Decision Making and Operating Efficiency

Proposal	Potential Positives for Efficiency	Potential Negatives for Efficiency
New federal-aid program for freight	<ul style="list-style-type: none"> • Revenue derived from user fees. • Grants competitively awarded. • Could generate revenue for high-value bottleneck projects. • Stable funding makes planning easier and more effective. 	<ul style="list-style-type: none"> • Pooling of revenues can result in productive facilities subsidizing unproductive ones. • Flat fee unrelated to costs of specific movements. • Specific objectives not defined. (What is to be built?) • Would bias private investment decisions in favor of federally favored projects.
National infrastructure authority	<ul style="list-style-type: none"> • Public infrastructure investment decision making depoliticized and rationalized from a national perspective. • Borrowing costs for public investment lowered through easier access to private credit market (in versions that would leverage public capital). • Credit assistance encourages user charges or other project-specific revenue sources. 	<ul style="list-style-type: none"> • Would depend on structure of authority, but federal capital subsidies to local projects could encourage low-value projects. • Centralization of powers and reduced political oversight would have risks.
Federally tax-advantaged borrowing to accelerate investment	Would avoid delay in completion of high-value projects.	If Treasury is not reimbursed from user fee revenue, would tend to undermine the efficiency-reinforcing features of the normal user fee–trust fund mechanism (i.e., that users pay fees or taxes covering costs and spending is constrained by revenue).
Federal assistance to private-sector rail and terminal operators	Could offset market distortions caused by subsidies to trucks in highway program, external costs of trucks, and regulatory suppression of returns on rail investment.	<ul style="list-style-type: none"> • Subsidies would result in excess consumption of all freight modes. • Government influence on rail investment decisions would tend to direct spending away from highest-return investments. • More effective remedies to market distortions are available (by adjusting truck fees and economic and environmental regulations).
New local or project-specific revenue sources	<ul style="list-style-type: none"> • Reliance on user fee revenue or other locally generated revenue discourages low-value projects. • Pricing can be used for optimum congestion management. 	New institutions with authority to raise revenue and organize projects may be needed; institutional obstacles could slow completion of high-value projects.
Adjustments to federal-aid highway program: reduced federal share; truck fee adjustment	<ul style="list-style-type: none"> • Lower federal matching share (leaving total federal outlays unchanged) would stimulate increased total (state plus federal) investment. • Truck fee adjustment would reduce freight market distortions; could stimulate rail investment; could reduce road maintenance costs. 	Could tend to reduce total spending in fiscally weak states, leading to gaps in the national network.

The proposals summarized in Annex 5-1 show great variation in the emphasis placed on user fees and on how fees would be determined. In some proposals, like the CSIS National Investment Corporation, federal participation would be used as an incentive to enforce reliance on user fee revenue, appropriate rules for setting fees (e.g., congestion charging), and privatization. In the California regional corridor authorities proposal, the basis of the finance arrangement proposed is project-level user charges. In contrast, other proposals would deemphasize or dispense with the principle of reliance on user fee revenue.

Among proposals that rely on user fees, differences in the structure of the fees proposed should be an important evaluation criterion. The outcome of state-level and national debates over the forms of possible fee schemes—for example, pooled regional fees versus facility-specific fees, use-based fees versus up-front contribution commitments in public-private partnerships, and fees imposed on containers versus tolls imposed on drayage trucks at ports—will affect the operations of the facilities in question as well as capacity investment decisions.

Rules on Project Selection and Control of Fee Revenue

Among the proposals summarized, three general approaches to investment decision making may be identified: continued reliance on the present system of legislative and administrative decision making in the public sector (possibly with adjustments to federal, state, and local responsibilities or with extension of this system to rail investment); the solution of the infrastructure authority proposals—delegating substantial power to an independent board of technical experts; and increased reliance on the market mechanism to guide investment decisions.

Most of the proposals would involve mixtures of these approaches but would emphasize one of them. Each approach has possible advantages. The existing decision-making arrangements have successfully delivered valuable infrastructure systems in the past and could be modified to improve their performance. One important area for improvement is in the structure of grants. It is known that the rules of the federal-aid highway program with regard to matching shares and caps on grants available to each state attenuate the leverage that federal dollars exert over total infrastructure spending. Similarly, tax incentives may be less effective stimuli for investment than other forms of grants with the same cost to taxpayers. In evaluating the various proposals for new grant programs and tax incentives, one of the criteria should be designing the program so that it maximizes the leverage of the taxpayer dollars provided.

Greater reliance on market-driven investment decisions has the most promise for improving the performance of the transportation system but will be challenging to implement. The TRB *Fuel Tax* committee observed that decisions will inevitably become more influenced by market forces as new or refined forms of facility-specific user fees are developed. For example, if highway mileage charges or other forms of tolls become more widely applied, highway capacity expansion decisions will have direct revenue implications for the state and local governments that own the roads. Similarly, greater reliance on user fees to pay for port services and port access routes will influence competition among U.S. ports and their relative rates of expansion. These connections among revenue sources, pricing schemes, and the long-term direction of capacity development should be major considerations in evaluating the alternative finance arrangements.

Transition Planning

None of the proposals summarized in Annex 5-1, with the exception of the TRB *Fuel Tax* committee's mileage charging proposal, gives much attention to problems of making the transition from historical finance practices to fundamentally new ones. The earlier TRB committee recognized that managers of public-sector transportation programs will require new competencies and new information sources as finance practices change. Agencies are confronting this problem today in dealing with such activities as toll road concession agreements (Foote 2006) and public-private joint projects. Proposals for finance reform should take into consideration the public-sector management requirements the reforms would impose and how agencies could be prepared to meet them.

Table 5-1 does not include a comparison of the categories of proposal on the basis of transition requirements, but none of them could be introduced confidently without careful planning and preparation. The challenges of introducing mileage charging are well recognized. Instituting a national freight user fee would require resolving conflicts with fees that some localities or states already put in place or are considering and could discourage local initiatives to develop such revenue sources. The success of a national infrastructure authority would depend on development of rigorous and practical procedures for project evaluation and development of a staff competent to conduct such a program.

REFERENCES

Abbreviations

AAR	Association of American Railroads
CBO	Congressional Budget Office
FHWA	Federal Highway Administration
GAO	General Accounting Office
TRB	Transportation Research Board
USDOT	U.S. Department of Transportation

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Annex 5-1

Examples of Recent Finance Reform Proposals

Annex 5-1 Box 1 lists the proposals summarized in this annex. The proposals are grouped according to their features into the categories defined in Chapter 5. The list is not comprehensive, and new proposals continue to be made regularly. The proposals described are intended to be representative of the most common forms of finance reform proposals over the past two decades. New proposals are likely to be variations on these forms.

ANNEX 5-1 BOX 1

Selected Finance Reform Proposals*New federal-aid program for freight*

- Critical Commerce Corridors proposal of ARTBA: An independent federal-aid program for projects on designated freight routes; funded by new user fees
- Federal Freight Trust Fund proposal of the Coalition for America's Gateways and Trade Corridors
- NSTPRSC Program to Enhance U.S. Global Competitiveness

National infrastructure authority

- National Investment Corporation proposal of CSIS: A federal entity empowered to issue bonds and make investment decisions; to be the sole source of all federal participation in transportation, water, and education infrastructure
- Dodd–Hagel National Infrastructure Bank: Bill in Congress derived from the CSIS proposal
- NSTPRSC National Surface Transportation Commission (advisory only)

Federally tax-advantaged borrowing to accelerate investment

- Transportation Finance Corporation proposal of AASHTO: \$60 billion tax credit bond issue; proceeds to be apportioned through existing federal-aid programs; tax loss reimbursed from Highway Trust Fund
- Wyden–Thune Transportation Finance Corporation: Bill in Congress for issue of tax credit bonds administered by a congressionally chartered corporation with power to select projects from state, local, or private proposals

(continued)

ANNEX 5-1 BOX 1 (*continued*)*Federal assistance to private-sector rail and terminal operators*

- Railroad investment tax credit proposal, supported by the Association of American Railroads: 25 percent investment tax credit for freight rail infrastructure spending
- Freight rail grant program proposals from NSTPRSC and other sources

Development of new local or project-specific revenue sources and institutions responsible for finance

- Tolling and road pricing proposals from TRB committees and other sources
- Waterfront Coalition California port access finance concept: Regional authorities sponsor projects funded by public–private partnerships with cost sharing; each project to be self-supporting
- Locally controlled port or container fee proposals from various sources
- Aviation finance proposals from TRB committees and others
- Port, harbor, and waterway finance proposals from TRB committees and others

Reforms to the federal-aid highway program to increase cost-effectiveness and federal leverage

- Changes in grant matching ratios proposed by GAO and others
- Changes in truck user taxes

SOURCES: See text.

NEW FEDERAL-AID PROGRAM FOR FREIGHT

These proposals would create an independent federal-aid program to fund freight infrastructure projects, with features modeled after both the federal-aid highway program and federal transit programs. The intent of such a program would be to increase funding for freight-related projects by making federal aid available to projects that are not now eligible, redirecting priorities in state and local transportation programs toward freight projects, and creating new revenue sources.

Critical Commerce Corridors

The Critical Commerce Corridors (3C) proposal originated with ARTBA (ARTBA n.d.; Potts 2007; Eldridge 2007). AASHTO has promoted the proposal in its publications, although it has not yet adopted an official policy position on it (*AASHTO Journal* 2007a; AASHTO 2007, 11). The proposal calls for a new federal program to provide financial aid to freight-related highway infrastructure projects, funded with new, dedicated user fees or taxes imposed on freight system users, available for projects on facilities that are part of a federally defined 3C system. The main features are as follows:

- The program is to be federally funded and directed, with a 25-year duration, and devoted to construction and upkeep of surface freight transportation facilities.
- It is to be paid for by dedicated revenue from new federally imposed freight-related user fees “and potentially other mechanisms” (ARTBA n.d.). (The revenue is dedicated in the sense that the law will dictate that spending over the life of the program will equal revenue collected.) Possible forms of fees that should be considered include a bill of lading tax, a truck mileage tax, a freight transaction fee paid by shippers, freight transfer station fees, tolls, and customs fees.
- In addition to the 3C program, the federal government should increase funding for the established federal-aid highway and transit programs (i.e., the 3C program should increase total federal transportation spending rather than divert it).
- While a role is to be preserved for state and local governments in project selection and execution, the federal government is to determine project eligibility so that funding goes only to projects serving national needs. Funds would not be apportioned by formula to states (except possibly aid for certain Interstate highway improvements). Presumably the federal government would accept grant applications from states and others and award support competitively. The proposal does not preclude federally initiated projects and implies that the federal government would be committed to initiating needed projects if others failed to do so.
- Eligibility is restricted to projects that are components of a federally designated national freight network of corridors, routes, and terminal facilities, the Critical Commerce Corridors System. At the least, selected highways and intermodal interchange facilities would be included in the system. Most or all of the Interstate highway system would be included. Freight railroads would be included if the railroad companies agree to pay some user fee into a national pool to be allocated to projects by the government. Waterways are not specifically mentioned.
- Improvements to the 3C System would be directed by a 25-year plan developed by the federal government cooperatively with state and local governments and industry. Cost estimates in the plan would determine revenue requirements and fee rates. The plan would include projects needed to ensure a specified minimum service quality on all segments of the 3C System.

The planning components of the 3C proposal (designation of a national system, a 25-year improvement plan with cost estimates, and service quality standards) have similarities to the European Union’s (EU’s) Trans-European Network (TEN-T) program, described in Chapter 4. The EU has designated a system of priority transportation corridors that are important for international transportation (of passengers and freight), including all transportation modes, and has developed a 15-year plan of improvements with cost estimates, based on detailed economic evaluations. In contrast to the 3C proposal, however, the role of the central authority (the EU) in project finance is secondary. The EU provides loans and small grants, but projects are the primary responsibility of the member countries, and adherence to the TEN-T plan is voluntary.

A second example of the concept of a centrally planned package of improvements to major freight infrastructure facilities is Canada’s new national fund for gateways and border crossings, which is to receive C\$2.1 billion over 2007–2013 from the federal government. Federal funds are to be matched with provincial and private-sector funds according to agreements formed for individual projects. The program is to carry out marine, road, rail, and air transportation improvements at a limited number of international gateways and intermodal hubs,

including border crossings between Canada and the United States. The federal program does not derive funds from any transportation user fee or dedicated tax (Transport Canada 2007).

Federal Freight Trust Fund

Another form of freight trust fund has been proposed by the Coalition for America's Gateways and Trade Corridors (Coalition for America's Gateways and Trade Corridors n.d.; Keane 2006). The proposal, which the coalition presented in 2006 to NSTPRSC, calls for creation of a new federal Freight Trust Fund, independent of existing trust funds, to provide grants to freight-related infrastructure projects. Revenue to the fund is to be partly from a share of the revenue of the federal Highway Trust Fund and partly from additional user and nonuser sources to be determined, possibly including a share of existing customs fee revenue. ["The cost of goods and goods movement should support and internalize some portion of the cost of expanding related infrastructure, such that growth in demand for moving goods supports corresponding expansion of infrastructure" (Coalition for America's Gateways and Trade Corridors n.d., 7).] The fund is to be pay-as-you-go rather than dependent on borrowing. Grants are to be competitively awarded to individual projects according to criteria similar to those specified in SAFETEA-LU for the Projects of National and Regional Significance program. Selection criteria are to favor multistate projects and projects with relatively large nonfederal contributions.

The coalition has a membership of about 40 organizations including port authorities and other state and local government agencies, as well as private-sector firms and groups in the engineering, railroad, agriculture, construction, and other sectors. It was formed to promote attention to freight in federal transportation programs and presented a similar proposal during debate over the previous reauthorization of the federal surface transportation aid program (GAO 2003).

It also has been suggested that federal action could take the form of a national fee imposed on cargoes, with an exemption for cargo passing through ports that had their own fees (Knatz 2008, 8; Mongelluzzo 2008). Such a provision in a national fee program would avoid penalizing ports that had taken the initiative in developing their own revenue sources and would reduce the competitive pressure that discourages port fees. Depending on the program rules, the outcome might be that most major ports would decide to impose their own fees to keep control of the revenues. Administering such a program would be challenging, both from the standpoint of collecting the fees and of deciding how to allocate expenditure of the national fee revenue among ports and other facilities.

The February 2009 report of the National Surface Transportation Infrastructure Financing Commission, one of the two finance commissions mandated in the 2005 federal surface transportation act (SAFETEA-LU), comprehensively reviews possible new sources of revenue to pay for publicly constructed freight-related infrastructure. The commission recognizes "the likely need for a significant portion of the revenues from certain freight sources to be dedicated to freight-oriented congestion and intermodal or border crossing projects and programs," that is, the need for a freight trust fund if new fees or taxes are imposed on freight movements, because "visible benefits are necessary to generate the industry support required to make the mechanism politically viable" (NSTIFC 2009, 112). The commission also rated a federal container fee and a fixed percentage surcharge added to customs duties as potentially appropriate and practical freight-derived revenue sources (NSTIFC 2009, 86, 87, 89). It stated its final conclusion as follows: "The Commission considered a number of alternative freight-related revenue sources

but determined that, while several of them may be viable options, the best way to increase funds from freight sources in the short run is by adjusting the fees that the entire trucking industry currently pays into the Highway Trust Fund” (NSTIFC 2009, 12).

NSTPRSC Program to Enhance U.S. Global Competitiveness

NSTPRSC, created by Congress in the 2005 surface transportation act (SAFETEA-LU), recommended that the federal transportation assistance programs be reorganized into 10 new functional programs. One of them, the Program to Enhance U.S. Global Competitiveness, would be devoted to freight transportation infrastructure. The procedures of the freight program would be as follows (NSTPRSC 2007, 15–19, 42–43, 46–47):

- Federal aid would be competitively awarded to states or to state–private partnerships. Awards would be guided by a National Freight Transportation Plan jointly developed by the federal government and state and local governments.
 - The federal contribution to freight projects would be 80 percent or higher.
 - At least some kinds of freight rail projects would be eligible, but private entities would not be subsidized. It is unclear how these two provisions would be reconciled.
 - Sources of funds for federal freight grants would be a collection of user taxes and fees whose revenues were dedicated to the federal freight program. They would include a new federal freight fee (which could be a container charge or freight waybill surcharge) as well as shares of existing fuel taxes and customs duties. State and local governments would be preempted from imposing their own freight user fees.
 - A federal investment tax credit would be available to railroads and other private-sector owners of transportation facilities who invest in capacity expansion.
 - State and locally imposed highway tolls would be expected to contribute to freight capacity expansion. Federal restrictions on tolling on the Interstate system would be relaxed to allow tolls to fund new capacity and for congestion management.

NATIONAL INFRASTRUCTURE AUTHORITY

These proposals, including bills introduced in Congress, call for federal creation of an independent authority with responsibilities related to infrastructure development, which in some proposals would have powers to borrow money and to make grants or loans to support infrastructure, including transportation facilities, according to selection criteria that the authority administers.

National Investment Corporation

The National Investment Corporation is a proposal of the Commission on Public Infrastructure, formed by CSIS, an independent think tank (Rohatyn and Rudman 2005; Ehrlich and Landy 2005; Kulisch 2006; Rohatyn 2008). The elements of the proposal are as follows:

- The National Investment Corporation would become (possibly after a transition period) the sole source of federal grants or other financial participation projects to build

infrastructure for transportation, water supply, and education. It ultimately would replace the existing transportation trust funds (except that a formula grant program for aid to small projects would continue). Federal agencies that build transportation infrastructure (principally the U.S. Army Corps of Engineers and the Federal Aviation Administration) would be required to apply to the corporation for project funds.

- The corporation would have the power to issue long-term bonds guaranteed by the federal government. Its revenue would include interest on loans and could presumably include the dedicated taxes now credited to the trust funds.
- The corporation would receive project proposals from state and local governments and from federal agencies.
- Selection of projects receiving grants or loans would be based on project-by-project evaluations by “a corps of expert project evaluators” (Ehrlich and Landy 2005, 15), eliminating formula allocations and congressional earmarking. Proposals would be required to show that all justified noncapital measures (e.g., demand management) had first been applied and that appropriate user fees were in place. Proposals would specify cost shares, and the federal share would be tailored to “a level commensurate with federal benefits” (Ehrlich and Landy 2005, 15).
- Criteria would favor private participation and could require that projects first be put up for bids for private construction and management before public funds were committed. [“Projects financed by risk capital are more likely to be rationally designed than those that emerge from the political process” (Ehrlich and Landy 2005, 11).]

The National Investment Corporation proposal has three objectives:

1. To expand and broaden the federal role in infrastructure in the belief that infrastructure decay is a national threat requiring a federal response and the states alone are not equal to the task;
2. To rationalize and depoliticize decision making, creating an objective process in place of current inefficient practices, which include earmarking; formula allocation of funds; conflict between advocacy and administrative functions in federal infrastructure programs; and underutilization of pricing, demand management, and private-sector provision [“Though underinvestment poses real risks, . . . committing resources to new infrastructure investments without a better process for guiding those resources . . . will not solve the problem” (Ehrlich and Landy 2005, 6)]; and
3. To accelerate spending [the authors cite an American Society of Civil Engineers estimate of a \$1.6 trillion spending gap over 5 years (Rohatyn and Rudman 2005)].

The authors note that operation of the National Investment Corporation would in effect create a federal capital budget separate from the operating budget, with the result that investment decisions would not be distorted by short-term cash availability. They cite the European Infrastructure Bank as a successful model of the proposal.

Dodd–Hagel National Infrastructure Bank

Legislation introduced in Congress in 2007 (S. 1926, August 1, 2007) would create a National Infrastructure Bank (Dodd 2007; Dodd and Hagel 2007). The bill is derived from the CSIS proposal described above. The bank would be an independent federal entity with powers to issue

U.S. government-backed bonds and to provide grants or loans to state and local government applicants for roads and bridges, housing, drinking water, and wastewater projects. The bond ceiling is \$60 billion. The bank would be governed by a board of directors and have an organizational structure modeled on the Federal Deposit Insurance Corporation. The bill does not provide any source of revenue for the bank other than interest payments on its loans, so any grants the bank provided would have to be funded from that source.

The main differences from the original CSIS proposal are that the bank would not replace any existing federal funding programs and that it would have no authority over direct infrastructure spending of other federal agencies. The legislative proposal therefore is a retreat from the CSIS proposal's primary emphasis on rationalizing the process of selecting the projects that receive support, while it retains the objective of accelerating spending (or perhaps is intended as an initial step toward CSIS's ultimate scheme). The project selection criteria applied by the bank are to favor "projects of substantial regional or national significance" that are "not adequately served by current financing mechanisms" (Dodd and Hagel 2007, 2) and projects that leverage public funds by attracting private-sector participation. The criteria do not refer to facility user fees or place any restriction on the sources of state and local government repayments of bank loans.

NSTPRSC National Surface Transportation Commission

NSTPRSC recommended creation of a permanent National Surface Transportation Commission (NASTRAC) to direct development of a national strategic plan (including a National Freight Transportation Plan) to guide investment. The plan would specify performance targets in each of 10 program areas, of which freight would be one. NASTRAC would recommend user tax rates to Congress (including rates for the new federal freight fee that the commission proposed) based on the revenue requirements for meeting the plan targets. This function would be analogous to that of the Postal Regulatory Commission, which recommends changes in postal rates to the Postal Service Board of Governors (NSTPRSC 2007, 33–37).

NASTRAC would be much more limited in scope than the other proposed forms of national infrastructure authority described above. It would not have direct authority over spending or finance decisions and would not function as a bank. The common feature of the various proposals is that all include provisions intended to insulate policy decisions on user fees and spending priorities from short-term political pressures and to strengthen accountability of infrastructure programs.

FEDERALLY TAX-ADVANTAGED BORROWING TO ACCELERATE INVESTMENT

These proposals call for a large immediate increase in the size of the federal surface transportation aid program, to be funded by borrowing rather than by requiring a prior increase in user fee revenue.

AASHTO Tax Credit Bond Proposals

In 2003 AASHTO published a proposal for debt financing of the federal surface transportation aid program, for consideration during the debate preceding the aid program's reauthorization

(leading to SAFETEA-LU) (AASHTO 2003b). The proposal called for creation of a Transportation Finance Corporation, a federal government entity that would issue \$60 billion in tax credit bonds. The proceeds would be allocated by Congress through the established federal highway and transit aid programs, as a supplement to the funds those programs customarily receive from the revenues of the federal motor fuel excise tax and other taxes dedicated to the Highway Trust Fund. The federal general fund would be reimbursed for the tax revenue lost by future transfers from the Highway Trust Fund (AASHTO 2003c).

Unlike the national infrastructure authority proposals described above, the AASHTO tax credit bond proposal had no provisions for reforming the process of allocating federal aid and would not create a revolving fund for infrastructure finance. The intent was to allow an increase in the federal-aid program without immediately raising the rates of the fuel tax and other taxes supporting the program. Disagreement on the tax rates and the size of the program was the obstacle delaying reauthorization. The provision for reimbursing the general fund would preserve the principle that the federal-aid program should be funded through user fees.

In more recent AASHTO publications, reimbursement from the Highway Trust Fund of the Treasury loss caused by the tax credit bonds is not referred to. An AASHTO 2007 submittal to NSTPRSC calls for three sources of “net new resources from outside the Highway Trust Fund”; an issue of \$220 billion in tax credit bonds over 20 years to pay for “transportation projects of national significance,” supported by dedicating to the purpose 10 percent of annual customs revenue; an investment tax credit for freight rail infrastructure investment (see below); and the 3C program described above (AASHTO 2007, 81–83).

Wyden–Thune Transportation Finance Corporation

A bill introduced in 2007 (S. 2021, September 6) would authorize a \$50 billion issue of tax credit bonds [that is, interest on the bonds would be paid in the form of federal income tax credits (CBO 2003)]. Credits would be transferable from bondholders to others. A Transportation Finance Corporation would issue the bonds and administer the disbursement of the proceeds. (The proposal could be grouped with the national infrastructure authority proposals but is placed here because its emphasis appears to be spending acceleration rather than governance reform.) The corporation would have authority to select projects from proposals submitted by states or others. It would receive revenue from customs duties sufficient to cover the principal repayment portion of debt service. The corporation would be a multistate organization formed by agreement among two or more state infrastructure banks. (State infrastructure banks are state government entities formed under federal law that provide loans for state and local government transportation projects.) The bill stipulates that the corporation would not be an agency of the U.S. government and that the bonds would not be U.S. government obligations. The bill has received endorsements from officials of AASHTO, the Associated General Contractors, ARTBA, the Chamber of Commerce, and the National Association of Manufacturers (*AASHTO Journal* 2007b).

Only general criteria for project selection and disbursement of the funds are stated. The bonds would be issued and proceeds disbursed over a 6-year period. Any public or private transportation project would be eligible to receive assistance, which presumably could be in the form of grants, loans, or loan guarantees. A nonfederal match of at least 20 percent of project costs and a 1 percent minimum allocation for each state would be required. It is unclear how rules in present law on the operation of state infrastructure banks would apply to the corporation.

Although the bill would create an entity with authority to select the projects that would receive federal backing, improved investment decision making does not appear to be a goal. The federal revenue lost on the tax credit bonds is a contribution from the federal general fund to transportation infrastructure spending. The bill states simply that “the purpose of this Act is to provide financing for additional transportation infrastructure capital improvements” (S. 2021, Section 2b).

FEDERAL ASSISTANCE TO PRIVATE-SECTOR RAIL AND TERMINAL OPERATORS

These proposals call for direct government aid to the industry on a significantly larger scale than has been practiced.

Railroad Investment Tax Credit

The railroad industry would be expected to prefer an investment tax credit to overt federal grants because the tax incentive would not restrict their freedom to make their own investment decisions and because the likelihood that any substantial sum would become available for grants is unknown. Legislation introduced in Congress (most recently, S. 1125, the Freight Rail Infrastructure Capacity Expansion Act of 2007) would allow a 25 percent investment tax credit on expenditures for railroad infrastructure and locomotives and would allow expensing (rather than depreciation) of expenditures to build or acquire railroad infrastructure. Infrastructure built by shippers and rail intermodal terminals would be eligible. The railroads estimate that the lost tax revenue would average \$300 million annually. The tax credit proposal is being promoted by the Association of American Railroads and has been endorsed by shippers’ groups (AAR 2007) and in an AASHTO submittal to NSTPRSC (AASHTO 2007, 83).

Other Rail Assistance Proposals

Various other forms of government involvement in finance of rail infrastructure are in existence or have been proposed. The federal RRIF program, created in 1998, provides loans and credit assistance for infrastructure investment but has never been used by a major railroad (FRA n.d.). Many states have rail assistance programs or have assisted railroads in special projects. A federal investment tax credit for track upgrading is already available to short line railroads only. An AASHTO-sponsored study in 2003 concluded that direct government support to freight railroads totaling several billion dollars annually in grants and loans for capital projects would be economically justified (AASHTO 2003a).

Proposals have been made for a railroad trust fund paralleling the federal Highway Trust Fund. The railroads oppose any such fund if it receives revenue from taxes on them. Proponents of a railroad trust fund in some instances appear to have in mind using the fund to pay for investments the railroads would not choose to make. For example, a railroad trust fund that would receive revenue from taxes on railroads and other sources was proposed by an Illinois congressman who was a prominent supporter of the Chicago CREATE rail project (Lipinski 2002). A parcel delivery firm executive, in a 2007 statement to the Surface Transportation

Board, proposed a federal railroad trust fund to support rail capacity expansion beyond the level of capacity that the railroads would choose to maximize their profits (Boyd 2007).

NEW LOCAL OR PROJECT-SPECIFIC REVENUE SOURCES AND FINANCE ARRANGEMENTS

The proposals described in this section are for arrangements to develop new, primarily user-derived revenue sources and new governance mechanisms for freight infrastructure. Such finance arrangements would be established by the owner of the facility, which may be the federal government, a state or local government, an independent public authority, or a corporation.

Regional Corridor Authorities

A group of shipper and carrier associations has proposed action by the California state legislature to create regional authorities with revenue-raising powers to coordinate the planning and construction of port access improvements and mainline facilities to carry international commerce through California. The proposal is endorsed by the Association of American Railroads, the National Retail Federation, the Waterfront Coalition, and other groups (Waterfront Coalition 2007) and was formulated in part as an alternative to a state-imposed statewide container fee, a measure enacted by the legislature but vetoed by the governor. The California proposal has been cited as a model that would be applicable in other states nationwide (Leone 2007; Mongelluzzo and Nall 2007; Mongelluzzo 2007; Fink 2007).

The provisions of the proposal are as follows:

- Four trade corridor authorities would be created under state law to “eliminate piecemeal action of local governments, port authorities and regional planning organizations” (Waterfront Coalition 2007, I-1). The authorities would correspond to the four principal trade corridors identified in the state’s freight plan, the Goods Movement Action Plan. Among the functions of each authority would be to “administer and coordinate projects” within its corridor that are identified in the state’s plan, to “ensure that bond proceeds (from the \$20 billion transportation general obligation bond issue authorized in 2006) are spent appropriately,” and to help “define and promote projects that may require no public support” (Waterfront Coalition 2007, 2–3).
- The authorities or the state would be the lead agencies in any freight infrastructure projects constructed with their participation.
- Most corridor projects would be structured as public–private partnerships. Private partners, participating voluntarily in agreements with the authorities negotiated for each project, would consent to pay fees commensurate with the “private” benefits of the projects (presumably the direct transportation cost savings to users of the facility) and would participate in governance of the project. The government partners would contribute to project costs in proportion to “public” benefits (perhaps including congestion, pollution, and safety benefits) (Waterfront Coalition 2007, 3).
- Each project will have an independent finance arrangement and mix of funding sources appropriate to the project’s mix of public and private benefits.

- Private-sector support for projects carried out by the public sector or in public–private partnerships would be via fees or “contributions.” Fees would be collected from the “actual users” of the facility constructed in a project. Revenues would be project-specific; no pooling of fees from a broad class of users into a fund for redistribution is to occur. “Contributions” appear to be the railroads’ preferred form of support, as opposed to the per use fees charged by the Alameda Corridor. Presumably these would be staged payments in cash or in kind (perhaps private construction of facilities in accord with the overall plan for the project in the public–private agreement) in amounts agreed at the outset and not proportional to use.

- Road and bridge tolls would be important project funding sources, and a pollution fee would be imposed on drayage trucks. The American Trucking Associations participated in the group that issued the proposal but withdrew because of the provisions concerning highway tolls and truck charges (Leone 2007).

- Fee revenues would be “firewalled” (i.e., available for use only for the specific project on which they were collected).

- Only those projects are to be selected whose primary justification is direct freight mobility benefits to shippers and carriers (i.e., “capacity, reliability, and velocity”) because these are the projects most suitable for public–private partnerships. Project selection criteria are outlined in the proposal, and specific projects that should receive initial priority are listed.

In summary, the regional corridor authorities proposal would provide an institutional structure for organizing joint public–private projects conforming to a long-term corridor plan, in which the public contributions would be drawn in part from the state’s infrastructure bond issue and private support would include user fees and in-kind contributions. Funding arrangements would be negotiated on a project-by-project basis. Funding would not involve broad-based revenue sources such as regional or state-level container fees or pooling of fee revenue from multiple facilities into a fund to be allocated by government.

TRB Fuel Tax Committee Road Use Metering Recommendations

The TRB *Fuel Tax* committee recommended steps to begin a transition from the present fuel tax–based highway finance system to one that would rely largely on revenue from automatically assessed mileage charges. It recognized that this transition would be a decades-long project but emphasized that preliminary steps would be immediately feasible (TRB 2006, 190–192, 196–199). One transition step the committee identified would be to impose mileage charges on commercial trucks on expressways. Automated truck mileage charging systems are already in operation on the entire German Autobahn system and in Austria and Switzerland (Sorensen and Taylor 2005). Such charging schemes seem likely to be adopted elsewhere in Europe and have been designed to allow incorporation of roads other than expressways and vehicles other than trucks.

The *Fuel Tax* committee observed that “the general introduction of mileage charging would have profound effects on every aspect of the management of transportation programs. The roles of the federal, state, and local governments would be altered; new criteria would become prominent in the selection of projects; highway managers would have new means of regulating traffic and controlling congestion, pollution, and accidents; and a more nearly optimal balance between transit and highway use and resources in urban areas would be attainable” (TRB 2006, 192). A system of mileage charging, even one limited to trucks on major roads, could help

reduce some of the institutional obstacles to more efficient financing of freight transportation infrastructure. It would provide a practical mechanism for internalizing the high external costs of truck operation, especially in urban areas, that have been the major justification for public financial assistance to railroads and to projects like the Alameda Corridor and CREATE.

Mileage charging systems would be operated by the state and local governments that owned and maintained the roads and would increase both the capability and the willingness of these governments to generate revenue to cover the cost of providing services to highway freight traffic.

Proposals for Reform of Finance Arrangements of Federally Provided Infrastructure

A 1991 TRB study committee considered how to cope with capacity constraints in the air traffic control (ATC) system and in airport operations. The committee noted “concern for the future about the [Federal Aviation Administration’s] ability to provide adequate capacity” (TRB 1991, 12) and recommended reform of the management and finance structure of the system. One option that the committee identified is to make the ATC system either a public or a private corporation with power to set fees charged to aircraft (under regulatory supervision). Fee revenue would pay for maintaining and improving the system (TRB 1991, 14–17).

The TRB committee also recommended adoption of congestion charging for use of airport runways and predicted that such charges would raise substantial revenue, which could be devoted to capacity expansion (TRB 1991, 10).

Proposals for reform of finance of harbor channels and inland waterways would increase reliance on fees to pay for capital expenditures and for operation of these facilities. Sources of such proposals include TRB committees, members of academia, and fiscal reform and environmental advocacy groups. They generally have been opposed by industry participants. The TRB *Freight Capacity* committee reviewed a range of finance and management reform proposals for water transportation (TRB 2003, 35–38, 40, 129–133). Fees charged to international traffic through seaports and airports must be related to the cost of serving the traffic in order to avoid violating international trade agreements prohibiting tariffs disguised as user fees.

Chapter 3 described fees that some ports have imposed on traffic through the ports to pay for harbor and access infrastructure, pollution mitigation, and congestion management. The American Association of Port Authorities (AAPA) disputes the necessity of the Water Resources Development Act of 1986 provision authorizing ports to impose harbor dues to pay for the local share of channel dredging projects, with restrictions. It seeks to have Congress eliminate the provision in favor of broad language recognizing that a port may impose fees to recover the cost of services it provides. The original problem was the need for revenue to pay for dredging projects, but AAPA’s proposal would allow fees for any service a port provided (Nagle 2008).

ADJUSTMENTS IN THE FEDERAL-AID HIGHWAY PROGRAM

Two changes in the federal-aid highway program have been proposed to increase the program’s effectiveness in achieving federal policy goals. First, the structure of federal-aid highway grants today provides only a weak incentive for states to spend more on capacity than they would in the absence of the federal program. The state matching share is small (20 percent for most projects),

and the total amount of federal grants for which a state is eligible is capped. Under these rules, if a state is undertaking more capital spending from its own funds than the minimum needed to match all available federal aid, any increase in federal aid will largely displace state funds rather than adding to total state highway spending (TRB 2006, 174). GAO estimates that a \$1 increase in federal aid increases state spending on highways by probably only about \$0.40; the other \$0.60 replaces state spending that would have occurred in the absence of the aid increase and, in effect, goes to support general state spending or state tax reductions (GAO 2004, 21–25). If the federal matching share in highway grants were reduced and the cap on available aid eliminated, a state's incentive to increase highway spending would be stronger, because every dollar the state spent would bring in additional federal aid. The total of federal expenditures could be controlled by adjusting the matching share (Gramlich 1990).

The second proposal is for adjustments in the present highway user taxes imposed on large trucks (at the federal level, the fuel tax; the Heavy Vehicle Use Tax; and excise taxes on sales of trucks, trailers, and truck tires) to align the charges paid by different kinds of trucks more closely with the costs of building and maintaining highway infrastructure to accommodate them. A more ambitious reform would be to impose mileage-based taxes on large trucks (TRB 2006, 164–167, 193, 196). Appropriate adjustments to fees would reduce the total of public and private costs of truck transportation by encouraging use of truck designs that reduce highway agency costs and would reduce or eliminate subsidies to trucks that distort competition with railroads. The effect of such adjustments on total revenue generated for the highway program is difficult to predict and would depend on the responses of truck operators and shippers to the rate changes. If revenue declined because of a reduction in truck traffic or because carriers began to favor equipment that paid lower fees, the loss would be offset by reduced highway agency costs.

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Abbreviations

AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ARTBA	American Road and Transportation Builders Association
CBO	Congressional Budget Office
FRA	Federal Railroad Administration
GAO	General Accounting Office; Government Accountability Office
NSTIFC	National Surface Transportation Infrastructure Financing Commission
NSTPRSC	National Surface Transportation Policy and Revenue Study Commission
TRB	Transportation Research Board

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Findings and Recommendations

The study charge asks the committee, first, to analyze the rationale for public investment in freight infrastructure and, as a related question, to assess the relevance of the concept of national significance as a possible criterion for determining government responsibility. Second, the committee was to evaluate alternative finance arrangements for freight infrastructure. The first section below presents the committee's findings concerning government responsibilities for freight infrastructure; the second section presents findings on the adequacy of existing finance arrangements and how alternative arrangements would affect the performance of the freight transportation system. In these two sections, bold text is used to highlight the statements of the major findings. The final section presents recommendations for changes in finance practices for freight infrastructure.

GOVERNMENT RESPONSIBILITIES FOR FREIGHT INFRASTRUCTURE

To analyze the rationale for public investment in freight transportation projects, the committee considered three questions: First, in what circumstances is public-sector involvement in the freight transportation system needed? Second, when is federal government involvement warranted? Third, when does the public-sector responsibility require building or paying for infrastructure, as opposed to any other form of intervention, for example, regulation?

Need for Government Involvement

In practice, government roles are dictated primarily by established responsibilities that are not likely to change fundamentally in the near term. Governments provide and operate most freight infrastructure, including the highway system, airports, seaports and harbors, and the inland waterways. Governments impose fees and taxes to support these facilities; provide research and information valuable for public and private planning, operations, and technology development; and impose environmental and economic regulations intended to increase the net benefits of the transportation system.

The policy proposals for new freight infrastructure funding mechanisms that are described in Chapter 5 all involve incremental alterations of these established government responsibilities: expanding responsibility in some way (e.g., greater involvement in freight rail capacity expansion), increasing direct federal responsibility (e.g., through a national freight plan or new federal-aid program), or expanding the private-sector role in a government-dominated area (e.g., privately developed toll roads). Such proposals should be evaluated carefully and the risks weighed against the possible benefits. **Expansion of government involvement should be limited to certain defined circumstances in which market-dictated outcomes would be far from economically efficient.** These include restraining exercise of monopoly power and dealing with nonmarket costs of pollution, congestion, and accidents. Moreover, **government involvement and leadership are practical necessities in complex projects:** large projects that

extend through multiple jurisdictions, involve sensitive environmental issues, and involve coordinated improvements to publicly and privately owned facilities serving passengers and freight.

Need for Federal Involvement

The federal government's role also is defined primarily by its existing responsibilities: the federal-aid programs for highways and airports, the systems directly provided by the federal government (air traffic control, inland waterways, and marine harbor channels), essential federal functions such as customs and border security, and federal environmental and economic regulations. **The federal government has important opportunities for contributing to freight system performance and infrastructure development by improving execution of these established functions.** Past Transportation Research Board (TRB) committees recommended changes in the federal highway and airport aid programs that would improve the performance of these systems, as well as policies to attain more efficient management of the federally provided facilities and more cost-effective environmental and economic regulation.

The federal government plays a secondary role in most freight infrastructure projects except those on the directly federally provided systems (waterways, air traffic control, and harbor channels). This limited federal involvement is consistent with federal responsibilities and competences.

There is a federal responsibility to intervene in exceptional circumstances where state and local governments and the private sector lack the capability to carry out a high-value project unaided. Such circumstances may include projects fulfilling essential federal responsibilities (e.g., defense and border controls), projects that impose high external costs on local communities that state and local governments lack authority to control, and unique or unusual projects with high potential return but also high risk and for which conventional methods of raising capital are not feasible. Also, through research, demonstrations, and incentives, the federal government can help state and local agencies to develop more successful administrative and finance arrangements for freight infrastructure projects. **The federal government needs more effective instruments, including reforms in financial aid programs, to carry out these responsibilities.** The committee's recommendations address this need.

Legislation and policy statements of the U.S. Department of Transportation (USDOT) and others over the past two decades have used the term "projects of national significance" to denote a category of projects with certain common characteristics: they are large, are discrete, usually involve improvements to multiple modes of transportation serving both passengers and freight, usually are located in urban areas and involve multiple government jurisdictions and private entities, and have finance requirements that do not match existing funding programs and institutional arrangements. The premise of the legislation and policy statements has been that a backlog of critical projects in this category exists. In these contexts, the term "project of national significance" (or "project of national and regional significance") always has been used to designate projects that are worthy of special federal support (that is, support beyond the established and routine forms of aid) because they possess these characteristics.

The case studies described in Chapter 3 illustrate that major transportation infrastructure projects are being carried out today on the basis of the institutional structures and finance arrangements that are available. In almost every public-sector project, state and local governments have taken the lead in organization and funding and the federal role is secondary,

providing usually a minority share of support. State and local governments and private firms routinely construct transportation facilities, without primary federal involvement, that serve national markets and affect system performance over a wide geographic area. In the nationwide infrastructure networks other than transportation, telecommunications and electric power, the federal government has little involvement beyond regulation. Conversely, much federal transportation aid is for primarily local facilities, such as transit and highway commuter routes.

National significance, as the term has generally been used in federal laws and in the transportation policy statements of various organizations, is not a definitive criterion for deciding which transportation projects merit extraordinary federal support or involvement. Indeed, any substantial freight transportation infrastructure project that is expected to yield positive benefits is significant to the national economy. Instead, the federal role should be defined more restrictively: a project merits federal assistance if it is of high economic value and would not be accomplished by the state and local governments and the private sector acting alone. The recommendations that conclude this chapter propose methods of applying such a rule.

Forms of Government Intervention

The grounds for government involvement identified above are circumstances where market outcomes would be unsatisfactory because nonmarket costs are important and where the private sector cannot act alone in complex institutional settings. Building or paying for infrastructure seldom is the only option for fulfilling the government responsibility in these circumstances. Government has a variety of means for resolving freight mobility problems. Regulation, taxation, and pricing can mitigate problems of pollution and congestion, and public-private cooperation to resolve a mobility problem does not require shifting of cost burdens for commercial facilities to the public. **Once the determination is made that government involvement is required, it is necessary to search for the most cost-effective action, considering public investment as well as other forms of intervention.**

Regulatory and Pricing Alternatives

Government responsibilities for environmental protection and for preventing anticompetitive behavior can be discharged in many circumstances through pricing of public facilities and through regulatory policies, rather than through compensatory subsidies. For example, public support of rail and waterways projects sometimes is advocated as a means to induce a shift of traffic from truck to modes with lower environmental costs, and to offset the freight market distortions caused by truck subsidies in the highway program and by the depression of rail investment incentives caused by economic regulation. However, subsidies to waterways or railroads to offset subsidies to trucks will lead to overconsumption of all the modes of transportation if the result is that the value of the service to some shippers is less than the cost of providing it. Instead, the states and the federal government could largely eliminate any subsidies for intercity trucking by adjusting truck user taxes. Similarly, if the railroads' argument that rate regulation is unreasonably suppressing railroad investment below the economically desirable level is verified, then adjusting the regulatory policies that are the cause of the problem would be the preferable solution, since this would restore market incentives as a reliable guide to railroad investment decisions.

Employing facility user charges for funding freight infrastructure projects to the greatest degree possible will promote sound investment decisions because users will be willing to pay only for projects that yield transportation cost savings in excess of the charges. In contrast, when infrastructure investment is paid for by external grants rather than by facility user charges or other local sources, distributional considerations often take precedence over efficiency in decisions on investment choices; commonly, political imperatives dictate a more or less uniform distribution of aid among regions. This pattern would be unsuitable for efficient development of major freight facilities, which require concentration of resources at the major nodes of the system. User charges also provide the most effective means for operators to regulate usage so as to avoid wasteful congestion and provide funding stability for capital and operating expenses, and they may be viewed by the public and by users as an equitable method of infrastructure funding.

Interventions for Community Impact Mitigation

The motivation for several prominent recent public freight infrastructure projects has been to reduce adverse community impacts as much as to add physical capacity to the freight network. The growing volume of freight traffic in port cities and in hub cities like Chicago conflicts with local traffic and imposes congestion and pollution costs on residents. Mitigating these impacts will be necessary to allow freight traffic to grow, because communities eventually will seek to halt growth through the political process if the costs are too great. Local freight traffic impacts may be mitigated by regulation or by pricing (congestion pricing on highways is an example), but local governments do not have authority in all circumstances to impose charges on carriers or to regulate their traffic. If freight trains are creating road congestion at railroad–highway grade crossings, the local government cannot require the railroad to alter its operations or to pay for an overpass. The government's options are pay for a capital improvement to mitigate the impact (e.g., a grade separation) or to pay the railroad to undertake some other mitigation.

However, numerous precedents exist for requiring transportation system users (or private-sector operators of facilities) to pay for impact mitigation. When new facilities or major expansions of existing facilities are to be constructed, the operator of the facility normally pays for mitigation features. Routinely, regulations require transportation operators to pay for pollution mitigation features in the design and operation of facilities and equipment (e.g., vehicle emission controls and runoff controls). On the basis of an analogous principle, construction of highway noise barriers is funded from highway user tax revenue rather than by the local communities requiring protection.

In practice, cost sharing in projects like grade crossing separations is determined by negotiation among the interested public and private parties. **Wherever shippers and carriers can be induced or required to pay for community impact mitigation, this outcome will not be detrimental to efficient freight system development** provided the cost of the mitigation is justified by its benefit to the community. **In cases where legal, equitable, or practical considerations prevent government from imposing the cost burden on shippers or carriers, it may be in the public interest for the government to pay for mitigation.** Government payment for mitigation will be consistent with economic efficiency provided that the government seeks cost-effective options for mitigation. As long as the cost of the mitigation measures is less than their benefit to the community and less than the value of maintaining service on the freight facility, the outcome will be in the public interest. The risk of an unfavorable negotiated

outcome is greater if funding for mitigation is available from the federal government, because the external grant relieves the local parties of the necessity of considering all the costs and benefits of alternative resolutions. If the federal government pays a share of costs, then it becomes responsible for the objective and quantitative assessment of the costs and benefits of the alternatives.

EVALUATING FINANCE ALTERNATIVES

The committee reviewed the finance arrangements in prominent projects, the forms of government involvement in project development and finance, and various groups' assessments of present finance arrangements and proposals for reforms. The committee did not systematically survey freight infrastructure needs; rather, the projects examined were taken as a representative cross section of major freight projects that have been carried out recently or may now be seeking funding. The goal was to determine whether existing finance arrangements are adequately serving the needs of industry and the public. The criterion for judging the arrangements has been their consequences for the performance of the freight transportation system. Satisfactory finance arrangements should promote efficient investment and operation. That is, they should encourage investments that yield economic benefits and discourage poor investments, and they should encourage operating practices on existing facilities such that service is provided to those who value it more highly than the cost of producing it and is not provided to others. The cost of transportation services includes congestion, environmental costs, and accident costs. Therefore, to judge the adequacy of finance arrangements, it is necessary to observe the performance of the freight transportation system.

The three findings summarized below concern deficiencies in present finance arrangements, the need for reform of finance arrangements to promote efficient development and operation of the freight transportation system, and the possible effects of alternative reforms on system performance.

1. Present finance arrangements are inadequate for maintaining and improving freight transportation system performance.

It is unlikely that the established finance arrangements will be able to support optimum capacity expansion at the most congested nodes of the freight transportation system because public-sector finance arrangements often are not designed to provide incentives for efficient development and operation of transportation facilities. Numerous past studies of infrastructure policy have concluded that finance arrangements are unsatisfactory. However, observers have most often characterized the primary problem simply as insufficient revenue and have overlooked the fundamental linkage between the structure of finance arrangements and the performance of the freight transportation system, specifically, that pricing is the most effective means of managing congestion and that reliance on user fee revenue is a strong incentive against selection of investment projects that have low economic value.

Freight infrastructure finance arrangements (that is, the sources of funds for operations and investment, methods of raising capital, policies with regard to pricing and fees, and authority and mechanisms for spending decisions) are diverse. Four principal methods are employed today to pay for freight infrastructure capital projects: appropriation of funds from general

revenue or other sources, trust funds that pool revenue from user taxes, explicit charges for use of particular facilities provided by the public sector, and private-sector provision of revenue-generating facilities. Sometimes the government effectively pays part of the cost of private capital expenditures through tax incentives. Among all these arrangements, the federal and state highway user tax–trust fund system generates the most revenue, and highway capital spending constitutes the majority of investment in freight-related infrastructure.

Because the test of finance arrangements is the performance of the freight system, the committee identified major categories of problems that today appear to hinder efficient operation and optimum investment. Several are closely related to finance arrangements and could be ameliorated by finance reforms. The first group of problems arises from the practices of infrastructure providers (primarily public-sector agencies):

- Operating and management practices of public infrastructure providers that fail to optimize performance. Users must tolerate congestion that could be avoided by better demand management through pricing or other methods. Maintenance practices do not minimize life-cycle costs because capital grants make capital spending cheaper than maintenance for local infrastructure providers and because political imperatives dictate wide geographic distribution of aid funds.

- Investment decision making that lowers the average return on investment. Capital spending often is directed according to distributional considerations (i.e., either to aid particular groups or regions or to ensure that all regions receive proportional shares) rather than targeted to investments that would yield the greatest public benefits. Such goals may be legitimate and many projects chosen on this basis may be worthwhile, but the cumulative result will be to reduce economic return on investment and compromise the goal of freight efficiency. Return on investment is depressed also because facilities are not efficiently operated. Public agencies do not systematically and objectively evaluate economic benefits of alternative investments. [Throughout this report, “economic benefit” includes nonmarket consequences of investments (e.g., environmental and safety impacts), as well as reductions in costs to shippers and carriers.]

- Public policies that add to costs and discourage investment by public- and private-sector participants. These include regulatory delays during project development that increase costs and risk; subsidies that distort competition, including subsidies for truck and water transport that discourage railroad investment; restrictions on foreign ownership and operation of domestic air and water transport facilities; and tax laws that place private-sector investment in highways at a disadvantage with respect to public investment.

- Lack of institutional capacity to undertake unique and complex projects at major ports and transportation hubs. Typically, such projects involve coordinated improvements to multiple modes with multiple objectives. They may be outside the scope of the established public funding programs (e.g., the federal and state highway programs) and outside the authority of any of the individual established organizations (highway departments, port authorities, railroads, etc.). Congestion in the Chicago region involving conflicts among rail and truck freight, highway passenger, and commuter rail traffic is an example of a circumstance where this problem is critical.

A second group of problems arises from social and economic trends external to transportation infrastructure providers:

- Patterns of freight demand are changing rapidly. Growth in international merchandise trade, most dramatically during the 1991–2007 period, caused bottlenecks at the major ports and inland intermodal hubs. The likely magnitude of such changes over the next decade is unclear; transportation demand trends may relieve capacity pressures to some extent. Growth in the volume of merchandise imports may be more moderate; demographic trends point to slower growth in highway passenger vehicle miles traveled; and higher fuel prices will slow traffic growth, alter logistics practices, and affect shippers' transportation mode choices.
- Increasing population density and wealth are driving up the costs of infrastructure expansion. In an increasingly urbanized society, costs of congestion and pollution are rising in importance, and these costs generally are not accounted for in market transactions. Competition from alternative uses of land is increasing, and the public is more concerned about environmental and land use impacts of expanding infrastructure. Organized opposition to infrastructure expansion in developed areas and at environmentally sensitive sites will exert still greater influence on investment decisions.
- Security requirements, especially at ports and land border crossings, are imposing new capital and operating costs and creating new administrative bottlenecks.
- Public (and, hence, political) support is lacking for user tax rates at the levels that would be required to maintain performance in the user tax–funded programs under present management practices. Increasing levels of investment in freight infrastructure in the next decades will be both economically justified and necessary to maintain a level of performance conducive to economic growth. However, while the costs of building infrastructure are increasing, maintaining revenue from fuel taxes, the largest present source for government transportation programs, is complicated by higher fuel prices and by government energy and environmental policies. The TRB *Fuel Tax* committee pointed out that public reluctance to support maintaining user tax revenue is a problem only if public skepticism about the likely benefits of increased public investment is misplaced, and it speculated that taxpayers would be willing to pay more if they perceived a better return on investment, in the form of improved performance (TRB 2006, 21).

These external challenges will call for flexibility and responsiveness in infrastructure programs and in finance arrangements, and they will place a greater premium on improving efficiency of use of facilities as a substitute for some new construction.

2. Finance reforms should be designed to promote productivity gains.

Maintaining and improving the performance of the transportation system will depend on achieving more efficient utilization of existing capacity and on improving the return on investment in new capacity. In an environment of strong upward pressure on costs, maintaining performance solely by building new physical capacity is not economically practical.

Finance arrangements can be a powerful instrument for improving the performance of the freight transportation system. Choices about funding sources and fees charged to users strongly influence investment decisions and the utilization of existing facilities. Any new program to increase freight infrastructure investment would risk yielding disappointing results if it was not accompanied by finance reforms that strengthened incentives to choose investments with the greatest public benefits, avoid investments with low returns, and operate existing facilities efficiently. Similarly, efforts to improve performance through better planning, improved

management techniques, or technological innovation will have limited success if not accompanied by complementary reforms in finance arrangements.

3. Finance reform options differ in their probable impacts on freight system performance.

The committee reviewed the proposals for new finance arrangements that have been prominent in discussions of transportation infrastructure policy: a federal-aid program for freight, a national infrastructure authority, acceleration of spending through federally subsidized borrowing, federal assistance to private-sector freight facilities, development of new local or project-specific capacities, and adjustments in the federal-aid highway program. The various proposals differ primarily in four characteristics:

- The division between public and private responsibility for providing funds and for investment decisions;
- The division of responsibility between the federal and state governments for providing funds and for investment decisions;
- The kinds of fees charged to users of facilities and the dependence of project funding on fee revenue; and
- The extent of subsidies, which may allow shippers to pay less than the cost of freight service for transporting any shipment.

Each of these characteristics influences public and private investment decisions and the decisions of system users about their transportation and logistics practices. Reforms must be selected with these performance consequences in mind.

Two criteria are equally relevant to the design of public freight infrastructure finance arrangements: first, to provide incentives for efficiency in investment decisions and operations; second, to generate revenue sufficient to fulfill government obligations and to carry out identified high-return capital projects. Provisions in finance arrangements that would promote each goal are identified below.

Opportunities for Improving Performance

Nearly all freight transportation infrastructure is paid for by revenue derived from users of the facilities. Pricing is the most effective management tool to reduce the cost of congestion. Public facilities that do not use pricing to manage demand suffer excessive congestion costs. At the same time, revenue from fees is the most informative measure of the economic value of capacity and therefore of the value of investing in expansion. Although much public transportation infrastructure is paid for by user taxes (e.g., fuel tax revenue dedicated to highways), explicit user charges and pricing are less commonly employed. For example, only 5 percent of revenues devoted to highways is derived from tolls. To attain major improvement in freight system performance, the public sector will need to place greater reliance on the market mechanism to manage operations and to direct investment in public infrastructure programs that are vital to freight transportation.

Progress also will depend on improvements in areas beyond finance, including new technology; better alignment of infrastructure responsibilities among the federal, state, and local governments; and review of regulatory policies to minimize impediments to efficient public- and

private-sector investment and operations. Greater capability in the public sector for economic evaluation of projects is needed. The ability of the managers of public infrastructure to identify investment priorities is hindered by deficient information. Public investment proposals are rarely subject to credible quantitative economic evaluation. Lack of information makes erroneous investment decisions unavoidable. The incentive for careful economic evaluation is strengthened when projects are expected to be self-supporting through revenue derived from users and especially when projects must rely on projected revenue to raise capital from private investors.

Options for Providing Revenue

If finance arrangements that promote efficient operation and investment were in place, then the second goal—funding sufficient to undertake high-payoff investments—usually would be met, because most projects that promised high returns would be able to fund themselves through user fees. However, refined pricing systems for highways and other major components of freight infrastructure will take time to develop. Therefore, revenue adequacy will continue to be a primary concern. The following are possible revenue sources to support increased capital spending for freight infrastructure:

- Dedicating a portion of existing highway user tax revenue to projects particularly valuable for freight;
- Increasing the rates of existing dedicated user taxes and fees for publicly owned facilities, including federal and state highway motor fuel taxes and other highway user taxes;
- Imposing new freight user taxes or fees that are not facility-specific (for example, national or regional container fees), with revenues credited to a trust fund and dedicated to freight projects, following the existing federal and state highway finance arrangements as models;
- Appropriating funds from general government revenue or dedicating revenue from a broad-based tax; and
- Instituting new facility-specific user fees that depend on the cost of providing service to the individual users of a facility. Possibilities include expanded highway tolling, fees for harbor dredging, airport landing fees, lockage tolls on the inland waterways, and port access charges.

These sources differ in the degree to which they could reinforce the goal of providing incentives for improved performance. New external aid programs that were supported by general tax revenue and that thereby relieved shippers of the major share of responsibility for the cost of freight services would discourage the development of project-specific revenue sources and rational project designs, which are the keys to keeping investment concentrated on the greatest needs. Such aid would increase the risk of inessential public contributions to projects that could have been accomplished with private-sector resources. Finally, subsidizing capacity stimulates uneconomic levels of freight traffic.

The last revenue source listed above would be the most consistent with the performance goal in most circumstances, although creating new facility-specific fees, especially in the case of large and complex projects, will be challenging. Fee structures must be tailored to the special characteristics of each project, and institutions (for example, special-purpose authorities) must be created with powers to impose and collect fees and dispense the revenues.

Bond sales, intergovernmental loans and credit assistance, asset leases and sales to private firms, and public–private partnerships do not appear on the list above because they are not revenue sources. Credit is a means of allowing a capital expenditure to be made before the revenue intended to pay for it is in hand. Privatization may be a means of easing the transition to new revenue sources. However, finance arrangements for any project or program must select the mix of revenue sources to be employed from among the five listed above.

RECOMMENDATIONS

Recommendations are presented below in five areas:

1. Guidelines for federal assistance to freight infrastructure development.
2. Federal discretionary assistance program reserved for freight projects.
3. Federal credit assistance and tax incentives for freight infrastructure projects.
4. Federal actions to promote new local and project-specific revenue sources.
5. Freight system monitoring, planning, and project evaluation.

1. Guidelines for Federal Assistance to Freight Infrastructure Development

Federal programs to assist development of freight infrastructure should adhere to the five guidelines listed below, in order to keep federal policy on a course to support the public's interest in improving the performance of the freight transportation system. The guidelines are intended to apply to federal involvement in projects for development of nonhighway facilities or multiple-mode facilities (e.g., coordinated improvements to freight rail, highway, and transit) that serve freight and that fall outside the bounds of the established finance arrangements for federal-aid highways and facilities directly provided by the federal government (inland waterways, harbor channels, and air traffic control). However, the principles underlying the guidelines with regard to the extent of federal responsibility and the importance of user charges are sound for any public transportation infrastructure investment.

The federal role in financial assistance should be facilitative and incremental.

Federal assistance should be used as a pragmatic means to stimulate action by state and local governments or by the private sector on difficult problems where the potential economic benefit from improved freight mobility or the potential reduction in external costs is great. In keeping with this objective, the dollar value of any special federal assistance to nonhighway projects and multimodal projects normally should not exceed a small share of total project costs. Limiting the federal share and requiring substantial investment by other government or private-sector participants ensure that the projects receiving assistance are those that have high value to their users and local sponsors and increase the leverage of available federal resources. This measure reduces the risk that aid recipients will undertake uneconomic projects or favor capital over noncapital solutions.

Federal assistance programs should promote development and use of well-designed facility charges and other local and facility-specific revenue sources.

Federal policy should encourage and provide incentives for development of local and facility-specific revenue sources to pay for construction and operation of freight facilities. Federal law should not impede imposition of user charges, and federal programs should not offer inducements to local authorities to substitute grants for funds that could be raised through user charges or other local sources. Although funding by user charges is not practical or desirable for certain projects, as a rule, reliance on user charges promotes sound investment decisions because users will be willing to pay only for projects that yield transportation and logistics costs savings for them that exceed the charges. User charges provide the most effective means for operators to regulate usage so as to avoid wasteful congestion and provide funding stability for capital and operating expenses, and they may be viewed by the public and by users as an equitable revenue source.

Federal assistance programs should be flexible and adaptable to diverse freight infrastructure projects.

Chapter 3 demonstrated the great diversity of freight infrastructure projects with respect to size, mode, institutional arrangements, finance structure, and purpose. Earlier in this chapter, it was explained that no definition of national significance is sufficient as a criterion for selecting projects meriting federal assistance; rather, federal program administrators must identify valuable projects that would not be completed or that would face substantial delay or higher costs without federal involvement. Thus, any federal assistance program should be structured to address projects on a case-by-case basis and should be flexible enough to address diverse assistance needs. Federal assistance should employ a variety of forms of aid, including grants, loans, and other kinds of credit assistance. Reducing federal restrictions on imposition of user charges also would constitute a form of financial assistance. Recommendation 2 below proposes an assistance program that would incorporate these features. Program administrators would be allowed discretion in selecting projects and in designing assistance to match individual project needs and would be accountable for demonstrating that the program was succeeding in producing worthwhile projects.

Legislation establishing federal assistance programs should direct the administration of the programs by defining project evaluation criteria rather than by identifying projects to receive aid.

Legislation should specify policy objectives and procedural rules for determining eligibility for assistance to be applied by program administrators. The administrative arrangements in the federal highway and transit programs can serve as models for any future aid programs. The vulnerability of major intermodal project funding to earmarking, as illustrated by the Projects of National and Regional Significance program in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), makes federal policies and procedural rules especially critical. Project earmarking in federal transportation assistance programs that circumvents executive agency evaluation weakens the effectiveness of those programs.

Federal policy to promote efficient freight infrastructure development should encompass reforms in regulatory, management, and tax policies that affect freight infrastructure performance.

The goal of federal freight infrastructure policy is to improve the performance of the freight transportation system, that is, to make freight services available at lower total cost to shippers and to the public. The scope of federal laws and programs that affect freight system performance and infrastructure development is broad. The federal government makes grants to state and local governments for highway and airport construction; builds and operates inland waterways, the air traffic control system, and harbor channels; regulates safety and environmental impacts of transportation; regulates rates and competition in the railroad and ocean shipping industries; controls international borders; and imposes general tax rules that affect the returns on alternative investments. Federal actions in each of these areas influence private-sector investment decisions, the cost of capacity expansion, and the operating efficiency of public and private infrastructure.

A comprehensive federal policy to promote efficient development of freight infrastructure cannot focus solely on grant programs. Rather, it must coordinate actions in all of these areas of federal involvement to achieve the common objective of improved system performance. Examples of areas for policy reforms that could improve performance and promote efficient infrastructure development include the following:

- Reducing project delivery time. The National Surface Transportation Policy and Revenue Study Commission (as its first recommendation), the TRB 2003 *Freight Capacity* committee, and other groups have identified specific regulatory and management reforms to speed project delivery without compromising essential environmental safeguards.
- Adjusting rates and structures of federal transportation user fees and taxes to correspond more closely to the cost of providing service. Fees that are out of alignment with costs distort modal competition, discourage private investment, and exacerbate congestion.
- Reducing obstacles to foreign investment in U.S. infrastructure, to the extent consistent with national security. Such obstacles include operational restrictions on foreign marine and aviation carriers that make foreign investment unattractive by reducing profit potential and restrictions on foreign equity ownership in U.S. facilities.
- Minimizing the impact of economic regulation on investment incentives. The railroads maintain that remaining economic regulation of their industry and the threat of increased regulation inhibit investment by suppressing profits.

Each of these areas of federal activity presents an opportunity to promote freight infrastructure development and therefore must not be overlooked in the formulation of federal infrastructure policy.

2. Federal Discretionary Assistance Program Reserved for Freight Projects

Congress should create a new discretionary assistance program to support freight infrastructure projects. The objective of the program should be to bring federal resources to bear to ensure completion of freight projects that would yield large national economic benefits or large reductions in external costs and that other government and private-sector parties could not complete without federal involvement, or could not complete in a timely and cost-effective manner. The program should be established initially as a test of the need for and value of a

responsive and flexible federal program of assistance to freight projects. It therefore should have a sunset provision, and its outcomes should be formally evaluated.

The recommended program would be similar in some respects to the Projects of National and Regional Significance program of SAFETEA-LU (as originally conceived, before project earmarks exhausted the program's authorized funding) and to the Transportation Infrastructure Finance and Innovation Act (TIFIA) program, but with these important differences:

- Dedication to projects in which increasing freight transportation efficiency through reduced costs or improved service is a major objective. The program would coordinate all federal efforts to promote efficient freight infrastructure development through financial assistance.
- Fewer restrictions on the types of freight infrastructure projects eligible for assistance.
- Greater flexibility with respect to the forms of aid, but with assistance limited to a minority of total project funding.
- Evaluation built into the program and recognized as a priority. The federal government needs to gain greater leverage through its assistance programs to influence the course of freight infrastructure development positively. The program would be an opportunity to test intervention mechanisms to determine the features that would meet this need.

The main features of the program should be as follows:

- *Limited initial scale:* The program should be funded by a multiyear congressional authorization, on the order of the magnitude of the SAFETEA-LU Section 1301 Projects of National and Regional Significance program. [The Section 1301 authorization was \$1.8 billion over 5 years. If half of an authorization of that size were used for grants, with the other half used to support the budgetary costs (loan loss reserves) for federal loans, the total amount of the credit assistance portion of the program would be \$9 billion to \$18 billion.] Funding preferably would not be taken from revenue now dedicated to other transportation purposes. However, to avoid complications during the trial period, initial funding from existing federal transportation user taxes would be suitable. Alternatively, general revenue funding, during the trial period only, would be acceptable.
- *Assistance awarded competitively:* Determinations of projects to receive assistance, and the form and amount of assistance, should consider the expected benefits of competing projects, the likelihood that projects would fail to advance without federal participation, and the ratio of the proposed federal contribution to total cost. Project selection should be based on explicit policy objectives and evaluation criteria. At least during the trial period, assistance should be awarded at the discretion of the Secretary of Transportation.
- *Limited initial duration and sunset:* The program should be enacted explicitly as a trial for a fixed term of 4 to 6 years with a requirement for independent evaluation at the end of the period to determine whether a larger, longer-term program is warranted. If evaluation shows that the program is worthwhile and it is renewed, the continuing program should be funded by a revenue source derived from freight system users. Also, if the program is renewed, the most appropriate form for its permanent organization should be considered. An alternative form would be to create an independent federal entity authorized to award assistance. Organizing the program as a government-owned corporation (which is the same organizational form as the National Infrastructure Bank proposal outlined in the President's Fiscal Year 2010 budget

message) would have two potential advantages. First, the board of the corporation would be, to an extent, insulated from pressures to award assistance on the basis of criteria other than national economic benefit. Second, such an entity might be better able than a federal executive agency to develop and retain a technically skilled and experienced professional staff solely devoted to evaluating and monitoring infrastructure investment proposals and projects.

- *Assistance in the form of grants and credit assistance:* Aid normally should be in the form of credit assistance. Grants (always for a minority of expenditures) should be considered only in instances where a loan would not suffice to allow a project to proceed and only for certain purposes, which would include the following:

- As preconstruction development assistance: Expenditures at this stage carry the greatest risk, and a future revenue stream to repay a loan cannot be assured.
- As an incentive for projects that demonstrate innovative finance arrangements and administrative structures.
- As an incentive for multistate projects and for coordination of development among the states. Facilitating interstate cooperation is acknowledged as a federal responsibility.
- To give the federal government leverage in promoting projects that are of particularly high economic value yet face especially difficult local obstacles.

It will be essential for the long-term success of the program that the subsidy cost provision in the budget of the assistance program reflect objective and accurate estimates of the risk of default of the projects receiving assistance and of the risk of the government incurring any other future liability under the terms of credit agreements.

- *Limited federal participation:* The value to the project sponsor of federal loans and grants should be a small share of total project cost. (For example, the limit might be 20 percent for a grant. The limit for the face value of a loan as a fraction of project cost should be higher than for a grant, because the value of a federal loan to the project sponsor, in terms of financing cost savings, and its cost to the federal Treasury are less than the face amount of the loan.) Projects applying for federal assistance in the program should have a financial plan that includes support from the private sector (except possibly for some highway projects) and from state and local governments.

- *Focus on capacity enhancement or environmental mitigation:* The program should be devoted to projects to construct freight capacity or mitigate harmful external impacts of freight traffic, or to equipment and start-up costs associated with operational improvements. Highways and some other facilities serve both freight and passenger traffic, so the distinction between freight and nonfreight projects is not absolute. The Secretary should have discretion to decide whether aid to a highway project (in most cases eligible for federal aid through existing programs) would be in keeping with the proposed program's overall goals. Highway projects that might be considered include local intermodal access links (e.g., a bridge essential for port access).

- *Preference for projects with user charges:* To support projects that have the greatest potential economic benefits and that will be sustainable in operation and to promote increased use of user charges, the evaluation criteria for proposals for aid through the program should give preference to projects whose financial plans call for primary reliance on user charges.

- *Economic justification:* Standardized requirements should be defined for demonstrating economic justification in applications for aid through the program. Applicants would present their own evaluation, to be reviewed by USDOT. The requirements should specify the benefits and costs to be considered and acceptable bases for estimation. The primary measure of benefits should be the National Economic Development estimate that is required of U.S. Army Corps of Engineers transportation projects. Applicants' evaluations and supporting data should be available for public scrutiny, or at least subject to independent third-party review.
- *Justification for federal involvement:* Applicants should be required to show that federal involvement would speed project completion, lower costs, or otherwise increase the likelihood of success. Federal involvement may serve to provide incentives and seed funding for early stages of project development and to lend credibility to high-risk but potentially high-benefit projects. Determining the value of federal participation will ultimately be a judgment of the Secretary, guided by the evaluation criteria and by experience gained with the program over time.
- *Outcome evaluation:* Applicants should be required to present a data and analysis plan and commit to conducting an outcome evaluation of the completed project that compares actual cost and usage with the projections that were the basis of the assistance proposal. USDOT would report to Congress periodically on the results of the outcome evaluations and on USDOT's assessment of the necessity of the federal involvement in the projects.
- *Integration with other assistance programs:* Administration of the program should be integrated with administration of freight project assistance that is delivered through the TIFIA, Railroad Rehabilitation and Improvement Financing (RRIF), and SAFETEA-LU private activity bond programs. That is, a single application and review process should gain consideration for all available forms of federal assistance. TIFIA, RRIF, and the private activity bond program (although not restricted to freight projects) have objectives similar to those of the proposed freight assistance program, and unified management would be necessary to maximize the federal impact. Primary responsibility for ensuring integrated administration of USDOT-administered programs should reside in the Office of the Secretary rather than in any of the modal administrations.

3. Federal Credit Assistance and Tax Incentives for Freight Infrastructure Projects

The federal government should make credit assistance more accessible and attractive to freight projects that merit federal support. Also, Congress should reduce the bias in tax law that discourages private-sector participation in development of highways and other transportation infrastructure historically provided by public agencies.

Three federal programs—the new federal assistance program for freight recommended above together with the existing TIFIA and SAFETEA-LU private activity bond programs—would constitute a tool kit of assistance instruments. Each of the two existing programs has a distinct objective. TIFIA credit assistance can be used as an incentive to stimulate local action or to encourage development of project-specific revenue sources. Also, federal credit assistance can reduce the total financing costs for some projects because the federal government is an efficient absorber of risk. The SAFETEA-LU private activity bond program's objective is to neutralize provisions in the tax law that tend to discourage private-sector participation in highway development. Both programs have demonstrated that they can perform the functions that Congress intended, and the committee assumes that they will be continued.

The recommended new freight assistance program would provide central policy direction of all USDOT efforts to promote freight infrastructure development. The program would have its own resources for grants and loans and in addition would oversee freight-related uses of the TIFIA and SAFETEA-LU private activity bond programs. The freight assistance program could award grants for the specific purposes listed in Recommendation 2 above (for preconstruction development assistance, as an incentive for projects that demonstrate innovative finance arrangements and administrative structures, and as an incentive for coordination of development among the states). This package of policy tools would not necessarily be adequate for all infrastructure problems that may arise, but it would strengthen the federal government's ability to intervene in a timely manner to promote valuable freight projects in circumstances where federal participation appears critical to achieving a successful outcome.

Credit assistance programs should be designed and administered to be consistent with the guidelines of Recommendation 1. Costs of federal assistance programs should be presented in the federal budget in a transparent manner, so that legislators and the public can understand the full costs of the programs and the incidence of those costs. Federal commitments equivalent to spending should appear in spending accounts and be funded by appropriations. The present-value cost of any form of federal credit assistance should be recognized in the budget at the time the commitment is made.

The adjustments to the TIFIA and private activity bond programs recommended below would give the managers of the freight assistance program more effective means of intervention.

Direct Federal Loans and Loan Guarantees

TIFIA is the primary federal program for providing credit assistance to transportation infrastructure projects but, as noted in Chapter 4, has not been frequently used in freight projects. **The following changes should be enacted to create a federal loan program that is more accessible to sponsors of freight projects and that gives USDOT increased flexibility to adapt the assistance offered to the characteristics of individual projects:**

- Modify or eliminate the TIFIA nonsubordination provision. The statute requires that TIFIA debt be treated equivalently to other senior debt in the event of bankruptcy of the borrower. This provision may lower the credit rating that the sponsor can obtain on its senior bonds. The federal government should be willing to accept a higher level of risk (that is, a junior lien position) on projects where it is providing a minority of the total capital and where the higher risk is justified by the potential economic return from the new project. The added risk of a federal loss that would arise from removing this provision from a loan agreement would be reflected in the subsidy cost assessed to the TIFIA-assisted project. In effect, program administrators would be allowed flexibility in allocating the total authorized subsidy cost among the projects receiving aid in a way that they judged would best serve the program's objectives.
- Allow a contingent federal loan commitment before all other elements of the financial plan are in place. The federal loan commitment could aid in recruiting additional sponsors and investors in the project.
- Allow the fraction of total project costs to be covered by the federal loan to be determined on a case-by-case basis and increased somewhat over the TIFIA 33 percent limit for certain purposes, including motivating project sponsors to employ facility user charges.
- Streamline federal application and contracting requirements.

USDOT could learn more about credit needs through a survey of project sponsors asking whether applying for TIFIA aid had been considered for their projects and, if TIFIA aid was not sought, whether the reason was lack of awareness or unacceptable features in the federal program.

Tax-Exempt Bond Finance

To encourage private-sector participation in provision of freight infrastructure, the tax laws should be neutral with respect to private versus public management and finance of the kinds of facilities that commonly are built by the public sector.

Tax-exempt bond finance constitutes a subsidy paid by the federal government to the benefit of the issuer of the bonds. It is generally available to state and local government infrastructure projects serving public purposes, but only in restricted cases (for constructing certain types of facilities specified in federal law, and with dollar limits on the volume of bonds that may be issued for highway and intermodal projects) for projects developed and operated by private entities. In cases where facilities could be built by the public sector, by a private firm, or by a public-private joint venture (e.g., a toll road), the lower cost of public borrowing favors public development and finance over development by the private sector.

Encouraging private-sector participation in the finance and management of facilities such as highways that normally are purely public-sector entities has several potential benefits. Private participation can be a source of innovation in the delivery and operation of facilities. A private operator may have lower costs than the government and may be able to exercise greater flexibility in pricing and in other operating practices than a government agency. The private-sector participants in a public-private project would be expected to absorb certain business risks that otherwise would be borne by the government (for example, by guaranteeing a construction completion date). Finally, private participation is a mechanism for attracting new sources of capital.

Private activity bonds should be available for private-sector and public-private projects to build highways and other kinds of freight facilities that now are provided predominantly by the public sector, in order to offset the tax law bias that now favors public over private development of these facilities. That is, if a state government is contemplating a choice between building a new road following traditional public-sector practice or awarding a concession to a private-sector firm to build and operate the road, its decision should depend on considerations of overall public benefit and not on differences in treatment under federal tax law. This objective presumably was the intent of the 2005 federal law that expanded availability of private activity bonds for transportation projects. To neutralize this bias fully, it would be necessary to adjust or eliminate the caps in federal law on the volume of private activity bonds that may be issued for highways and other specific categories of projects.

Infrastructure Banks

Another possible source for government assistance would be an infrastructure bank: a revolving fund, capitalized, at least in part, by the government. If new federally sponsored infrastructure banks are created, their operation should be consistent with the principles for federal assistance listed in Recommendation 1 above. Preference should be given to projects that generate revenue

for loan repayment, and requirements should be imposed for efficient operation and pricing of bank-financed facilities.

4. Federal Actions to Promote New Local and Project-Specific Revenue Sources

The federal government should reduce barriers to the development of local and facility-specific revenue sources to pay for construction of freight transportation facilities and should provide incentives to encourage use of these revenue sources. Paying for projects from revenue generated by the facilities themselves promotes operating efficiency (because pricing is the most efficient way to manage congestion) and favors efficient investment decision making (because reliance on user fee revenue favors projects with the greatest benefits to their users). This strategy may also be the most practical method of increasing funds available for freight infrastructure, considering that government fiscal constraints and implementation difficulties pose challenges to instituting other forms of revenue sources for freight projects that have been proposed (which include general revenue funding, diversion of revenue from existing transportation user fees, and nationwide or statewide pooled freight user taxes).

The states are responsible for creating the organizational arrangements required for imposition of fees and application of fee revenue for support of facilities that state agencies own and operate. However, the federal government can support such state efforts. The federal government should take the following actions:

Remove barriers to user charges and establish federal policy in support of such charges.

Congress should reduce impediments to imposition by port authorities of charges on cargoes passing through their ports by establishing in law a clear federal policy in support of such charges for the purpose of providing revenue for construction and operation of port facilities and road and rail access routes. As described in Chapters 3 and 5, the authority of ports to impose certain user charges has been questioned in the past, and some port charges have been subject to federal regulatory scrutiny. The Federal Maritime Commission (FMC) has authority to reject any agreement involving port terminal operators that it judges to unreasonably affect competition, service, or transportation costs, and FMC has applied this authority to review port fees. Congress acted previously, in the Water Resources Development Act of 1986, to authorize fees (specifically harbor dues to pay for dredging), ensuring that they could not be challenged as inconsistent with constitutional provisions, but also eliciting industry objections that the law implied that the ports' authority to set fees is narrowly restricted. A federally sanctioned port user charge program could be modeled on the airport passenger facility charge: it would be voluntary, it would authorize specified forms of charges and charges whose revenues were dedicated to specified uses, proposed uses would be subject to public review and comment, and each port would retain all revenue from the charges it imposed.

In addition, provisions in the federal-aid highway program that restrict imposition of tolls on highways built with federal-aid funds should be removed, although federal responsibilities (for example, to ensure that interstate commerce is not interfered with) may necessitate some form of oversight. Highway and bridge tolls can be a practical revenue source for highway projects, including port access and other intermodal connector projects. States should be allowed to impose tolls on federal-aid roads and allowed flexibility in the design of toll systems.

Promote user charges with incentives.

Federal assistance to freight infrastructure projects should include incentives to encourage transportation facility operators to undertake user-charge funding and to establish organizational arrangements for setting charges and providing facilities. The objective of the incentives would be to demonstrate successful arrangements that would attract imitation at other facilities.

USDOT's National Strategy to Reduce Congestion (which offered competitively awarded grants to projects to demonstrate congestion pricing) is an example of such an incentive program.

Incentive grants should be administered through the discretionary assistance program proposed in Recommendation 2 above. More attractive credit assistance, as proposed in Recommendation 3 above, also would serve as an incentive for development of project-specific revenue. Of equal importance is avoidance of grants that relieve the principal parties of primary responsibility.

Remove barriers to international investment.

Congress should act to reduce legal barriers to foreign ownership, operation, and investment in the U.S. transportation industry, particularly in the maritime and aviation industries, to the extent consistent with national security. Foreign direct investment is an important source of capital growth in many U.S. business sectors. Restrictions on foreign ownership and operation inhibit foreign investment in U.S. facilities. According to ratings of the Organisation for Economic Co-operation and Development (OECD), U.S. laws and regulations influencing foreign direct investment in the transport sector are more restrictive than for any other major U.S. business sector, and more restrictive than the average among OECD countries for the transport sector.

Provide information, planning, and training assistance.

The federal government can promote use of local and project-specific revenue sources through information dissemination, planning assistance, and training. USDOT should serve as an information clearinghouse and technical assistance resource, as proposed in Recommendation 5 below.

5. Freight System Monitoring, Planning, and Project Evaluation

The federal government should expand its capabilities for freight system planning and project evaluation and for data collection in support of freight system performance monitoring. USDOT has in recent years increased its attention to these functions, and its efforts have produced valuable results. However, a sharper focus on monitoring and evaluation that directly support federal and state decision making on system management and investment priorities, broader coordination among government agencies and with the private sector, and greater resources are necessary.

Organizational Structure

USDOT should designate or create a discrete, identifiable institutional home for the functions of project evaluation, performance monitoring, and technical assistance to state and local governments. These functions should be organized within USDOT in such a way that they are

not perceived as primarily the function of any single modal administration. The joint program office form of organization is one model to consider. The organization should have established relations with all federal agencies whose policies and programs affect freight transportation and transportation finance, or that engage in data collection and analysis related to freight transportation, including the Surface Transportation Board, the Department of Energy, the Treasury Department, and the Department of Commerce. The organization will require a staff with diverse professional expertise.

The organization should also have cooperative relationships with state and local governments and with the freight industry. It should provide products that are useful to state and local governments, including evaluation and planning techniques that define best practices. Contact with the private sector will be necessary because the organization's effectiveness will depend on its understanding of the freight transportation industry and freight markets. The Highway Trust Fund would be one appropriate source of support for the organization's activities, since most activities will relate to highway transportation along with other modes, and the other modal trust funds also could contribute.

Freight System Monitoring

The federal government should expand its existing freight system monitoring program by developing a continuing, comprehensive, and systematic program to monitor the performance of the national freight transportation system and to identify sources of inefficiency.

Monitoring should measure performance in economic terms: transportation costs (including costs to shippers and to taxpayers and environmental costs) and productivity. Physical measures of performance (e.g., transit times and congestion delays) must be monitored as the basis of the economic measures. Monitoring would identify the most important local physical bottlenecks that are degrading performance, estimate the costs of congestion at these bottlenecks, and monitor progress in alleviating them. Monitoring also would identify institutional obstacles retarding productivity improvement. Obstacles include freight transportation market distortions caused by external costs and subsidies, which lead to inefficient operating practices and investment decisions. Effective monitoring will require more comprehensive and regular data collection efforts (e.g., regular conduct of the Commodity Flow Survey and regular pooling and sharing of local traffic performance data) and use of advanced data management systems.

Freight System Planning

The federal government should develop improved capabilities for short-term forecasting and for short- and long-term scenario analysis of freight transportation markets and freight transportation system performance. Because public infrastructure adapts slowly to changes in market requirements, improved planning could have high value. The most important planning functions at the federal government level are (a) to establish an understanding of how government actions affect system performance; (b) to anticipate future developments in transportation markets and technology, in the United States and globally, that will affect freight system performance in ways that will require a government response; and (c) to identify and evaluate alternative government responses aimed at maintaining efficient performance in the face of changing external circumstances. Resources should be devoted primarily to developing planning and analysis tools

that directly support specific federal decisions. For example, the federal government should have the capability to evaluate the system performance impacts of federal regulations and the effects of alternative structures of federal infrastructure assistance programs on investment levels and priorities.

These planning functions should use methods that incorporate consideration of risk and uncertainty. The expected risks of decisions in an uncertain environment should be identified and provision made for monitoring the deviation from present expectations. A risk-based management strategy should be developed that identifies review points where policy can be changed if circumstances evolve differently than anticipated.

Project Evaluation

The federal government should undertake a program of research, demonstrations, and outreach activities to develop and promote the use of sound project evaluation in public freight infrastructure programs. Evaluation is the process by which governments identify candidate projects, decide which projects are suitable for government participation, and set priorities that determine which projects receive support. To negotiate partnerships successfully in joint public-private projects, government parties must be capable of independently assessing commercial value to the private-sector participants. The public sector must be able to evaluate not only expected costs and benefits but also risks, and how risks would change with alternative finance arrangements for a project.

Through this program, the federal government should work closely with state and local government agencies to develop these agencies' technical capacity in project evaluation. The first steps in the program should be the following:

- Targeted research to close evaluation data gaps. Such gaps include information on costs of changes in freight traffic, the causes and costs of congestion, and the value of speed and reliability.
- Critical review of past evaluations and of project evaluation methods employed in other infrastructure programs (in the United States and abroad) to identify problems with present practices and the most useful available methods.
- Definition of evaluation frameworks, including principles and practical methods for project evaluation. Any federal program that entails economic evaluation of project proposals should have a standard evaluation protocol that specifies costs and benefits to be estimated quantitatively, estimation methods, and data required.

A closely related form of evaluation is the outcomes evaluation: the determination of whether a given investment accomplished its goals. Without such ex-post evaluation, there is no systematic evidence on which to judge the success or failure of a public program. Evaluation of outcomes of government-built and government-aided freight infrastructure projects should be a requirement. When the outcomes evaluations show that a program is not meeting its objectives, the program should be revised or terminated.

REFERENCE**Abbreviation**

TRB Transportation Research Board

TRB. 2006. *Special Report 285: The Fuel Tax and Alternatives for Transportation Funding*. National Academies, Washington, D.C.

Study Committee Biographical Information

Genevieve Giuliano, *Chair*, is Professor and Senior Associate Dean of Research and Technology in the School of Policy, Planning, and Development, University of Southern California (USC), and Director of the METTRANS joint USC and California State University Long Beach Transportation Center. She was named the Margaret and John Ferraro Chair in Effective Local Government in 2009 for her work in regional transportation policy. She also holds courtesy appointments in Civil Engineering and Geography. Professor Giuliano's research focus areas include relationships between land use and transportation, transportation policy analysis, and information technology applications in transportation. She has published more than 140 papers and has presented her research at numerous conferences both within the United States and abroad. She serves on the Editorial Boards of *Urban Studies* and *Journal of Transport Policy*. She is a past member and Chair of the Executive Committee of the Transportation Research Board. She was named a National Associate of the National Academy of Sciences (NAS) in 2003, received the Transportation Research Board (TRB) William Carey Award for Distinguished Service in 2006, and was awarded the Deen Lectureship in 2007. She has participated in several National Academies policy studies; currently she is participating in the NAS study America's Climate Choices. She is Chair of the California Research and Technology Advisory Panel, which advises the California Department of Transportation and the Department of Business, Housing, and Transportation on the implementation of the Growth Management Plan.

Peter J. Basso is Chief Operating Officer and Business Development Director of the American Association of State Highway and Transportation Officials (AASHTO). Before joining AASHTO in 2001, he served as Assistant Secretary for Budget and Programs and as Chief Financial Officer of the U.S. Department of Transportation. Mr. Basso's 34 years of service as a career official included assignments as Deputy Assistant Secretary for Budget and Programs of the Department of Transportation, Assistant Director for General Management of the Office of Management and Budget, Deputy Chair for Management of the National Endowment for the Arts, and Director of Fiscal Services for the Federal Highway Administration. He received a BS degree in business administration from the University of Maryland.

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