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A Federal Role in Freight Planning and Finance

Sandra Rosenbloom, Martin Wachs

Supported by the Supply Chain Policy Center
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The research on which this monograph is based was initiated by the RAND Supply Chain Policy Center to inform ongoing debates about re-authorization of major U.S. surface transportation legislation to address growing challenges faced by the U.S. freight system. This objective largely limited the focus to freight moved on the highway network and at intermodal facilities. This monograph offers four elements of a federal freight policy that respond to widely held stakeholder and analyst views and concerns. A key element is a federal freight capital assistance program whose basic tenet is that the federal government should fund only that portion of an economically efficient freight project that is determined to be in the national interest, requiring local beneficiaries, public and private, to pay a share of costs proportionate to the benefits they receive. The monograph also suggests ways in which these policy elements could be efficiently and sustainably funded.

This monograph should be of interest to national, state, and local officials formulating policy related to the financing of facilities for the movement of freight. This includes highways and rail and intermodal systems. It should also be of interest to managers in the private sector who work in the fields of logistics and transportation, as well as land development related to goods movement and intermodal facilities, such as inland ports.

The research reported here complements work previously published and ongoing studies that deal with the impacts of highway investment on the state of the national economy:


RAND has also recently carried out related work dealing with congestion and operational efficiency in the national freight transportation network and continues to work on several topics within the theme of transportation finance. Examples of this recent work include studies addressing the applicability of charges for road use that use electronic fees per mile of travel and assessments of alternative and novel charging systems for highways:


Such research is continuing at RAND, as are studies of the impacts upon state departments of transportation of new highway technology and alternative fuels.

**The RAND Supply Chain Policy Center**

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Questions or comments about this report should be sent to the project leader, Martin Wachs (wachs@rand.org).

Information about the Transportation, Space, and Technology Program is available online (http://www.rand.org/ise/tech). Inquiries about TST research should be sent to the following address:

Dr. Johanna Zmud, Director  
Transportation, Space, and Technology Program, ISE  
RAND Corporation  
1200 South Hayes Street  
Arlington, VA 22202-5050  
703-413-1100, x5412  
Johanna_Zmud@rand.org
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Summary

There is widespread consensus that there are serious problems in the U.S. supply chain network that threaten the nation’s economy and productivity; the most prominent of these is congestion. There is also consensus that traditional revenue sources are both inadequate and inappropriate to respond to these problems. Because congestion has multiple causes and the costs of congestion are experienced largely by local stakeholders, it is difficult to identify a clear national role in addressing freight congestion and related problems.

In response to these problems, this monograph describes four elements of a federal freight policy designed to address growing challenges faced by the U.S. freight network in an environment dominated by declining revenues and public resistance to increasing taxes. Challenges in the supply chain network currently cost U.S. shippers, businesses, and passengers billions of dollars per year in lost time and productivity, increased transport costs, and lack of reliability, while at the same time disrupting communities and creating health and environmental problems. Although the freight network is complex and involves many modes, our major focus is the highway component of the freight network, which is experiencing many problems related to the aging of facilities, congestion, rising costs, and declining revenues from user fees. The sources of these problems are complex and rarely result from capacity constraints alone. The costs resulting from these problems are often what economists call *externalities* that are largely borne locally and fall most heavily upon private stakeholders. Highway congestion and air pollution are two examples of such problems.
There is a great deal of consensus as to the nature of problems faced by public agencies, and there is even some agreement on appropriate objectives for federal policy, even though there is much disagreement about particular strategies, projects, or investments. Six objectives or goals commonly advanced for a new federal freight policy are presented in this monograph:

- Improve freight planning at every level of government by improving freight data, disseminating best practices and promising approaches, and increasing institutional capacity.
- Provide federal financial assistance to appropriate freight projects based on justifiable and sustainable revenue sources.
- Condition federal assistance to freight projects on specific and measurable performance criteria.
- Require any federally supported freight projects to have a substantial user-pays component.
- Reform regulations that inhibit the competitiveness of various freight modes or inhibit the active involvement of the private sector in freight projects.
- Respond to market failures, such as the lack of cooperative efforts, and positive and negative externalities from freight projects.

After developing these six objectives, the study goes on to describe four elements of a federal freight policy strategy that respond to those six objectives. The four critical elements of a national program are:

- Develop a federal capital freight assistance program using sustainable revenue sources, basing funding decisions explicitly on specific performance measures while addressing externalities and spillovers.
- Reform regulations that directly or indirectly inhibit or distort competition among freight modes or place financial restrictions on the participation of private stakeholders.
- Increase user-based pricing to improve the economic efficiency of the freight network and create a sustainable revenue source for
federal freight programs, recognizing that these two goals are not always compatible.

- Enhance the ability of state, regional, and local planners to address pressing freight issues by improving the quality of freight data, knowledge of best practices, and the capacity of local institutions to more effectively plan complicated and complex freight projects.

A key dimension of the first element is determining what share of an economically efficient freight project is in the national interest, requiring other beneficiaries to pay their fair share of project costs. Traditional cost-benefit analysis looks at aggregate benefits and costs and concludes that projects should or should not be undertaken, depending on the sums of both benefits and costs. But freight projects often benefit and impose costs on different governmental bodies at the same time, and aggregate benefits and costs do not address the concerns of the different stakeholders. In this study, we argue that since benefits and costs are accrued and incurred by different levels of government, it is possible to assess a benefit-cost ratio for each party to the funding. A fair division of cost responsibility would divide costs in proportion to the benefits that accrue to different levels of government.

The approach developed in this study does not accept several key elements of many widely discussed freight proposals. We reject the notion that the federal government should have a significant financial role in funding freight infrastructure improvements simply because of the special nature of the freight network, its key role in national productivity, or the fact that freight often moves on the interstate highway system. We also do not conclude that the federal role should always be a minor one, occasioned only by the failure of other stakeholders and beneficiaries to act. Instead, we argue that the federal government should develop policies and programs that identify the specific local, regional, and national beneficiaries of various freight projects and should apportion costs as fairly as possible among all beneficiaries. The federal government would fund only that portion of the project that creates a national benefit, roughly equivalent to widely diffuse benefits and those that cannot be attributed in reasonable ways to those who can or should be made to pay.
To be cost-effective, federal assistance should be specifically matched to the needs of highly rated freight projects. Possible national responses depend on the nature of the problem being addressed by a freight or intermodal project. The federal response could involve any or all of the following:

- providing financial support to bring stakeholders together and conduct preliminary planning efforts
- offering loan guarantees and loan subsidies for those projects that could be entirely self-sufficient over time but need startup costs
- providing outright capital grants limited to the federal share of proposed projects.

There is substantial discussion of the need for new or different national freight regulations, particularly those that affect prices and thus competition between the freight modes and inhibit the involvement of the private sector in freight projects. After analyzing and discussing the many issues associated with federal freight regulations, we recommend several changes to them that might make the system more efficient while serving important national goals related to safety and efficiency. Many potential regulatory reforms are discussed in the body of this monograph. If appropriate, the federal government may wish to fund demonstration projects to test the most controversial regulatory revisions that are considered. The most widely discussed regulatory elements advanced for additional study are as follows:

- allowing private-sector participants to obtain funding from the Transportation Infrastructure Finance and Innovation Act (TIFIA) and comparable railroad programs (perhaps limited as to amount)
- identifying the specific regulatory barriers to greater use of current federal grant programs for private or public-private freight projects and developing ways to relax or remove them
- permitting combination or heavier trucks on limited routes to determine the impact and public response (Transportation Research Board [TRB], 2002).
We also describe appropriate and sustainable financing mechanisms for each element of the proposed freight strategy and make a strong case for user-based financing of most facilities. There is an important federal role in expanding current pricing efforts to fund pilot or demonstration freight pricing projects, such as greater national use of vehicle miles traveled (VMT) charges on trucks that vary, at a minimum, by distance and weight per axle, time of day, and, when technically feasible, the type of roadway or facility being used. The federal government could also fund a demonstration project to test truck-only or commercial motor vehicle (CMV)-only lanes.

The transportation policy and research communities have long noted the importance of better data to support policymaking, and this study also takes note of the desperate need for improved freight data collection and dissemination. Federal leadership is essential to the development of policy-responsive databases. There is also a critical need for federal sponsorship of research on how to expand data collection and enhance the availability of data for local, regional, and state policymakers. Progress is needed in these areas if the other recommendations included in this monograph are to be implemented.
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Abbreviations

BCA  benefit-cost analysis
CBO  Congressional Budget Office
CMV  commercial motor vehicles
CREATE  Chicago Regional Environmental and Transportation Efficiency Program
DOT  U.S. Department of Transportation
FHWA  Federal Highway Administration
FTA  Federal Transit Administration
GAO  U.S. Government Accountability Office
HVUC  heavy vehicle user charges
MPO  metropolitan planning organization
NCFRP  National Cooperative Freight Research Program
NCHRP  National Cooperative Highway Research Program
OECD  Organisation for Economic Co-operation and Development
TIFIA  Transportation Infrastructure Finance and Innovation Act
TRB  Transportation Research Board
VMT  vehicle miles traveled
WEB  wider economic benefits
Both domestic and international trade volumes have grown substantially over the past four decades and are likely to increase even more in the coming ones (Weatherford, Willis, and Ortiz, 2008). As a result of this growth in trade, a National Cooperative Freight Research program (NCFRP) report (2009) concluded that U.S. freight volumes will grow by 90 percent between 2004 and 2030, while international trade alone will quadruple by 2035 (U.S. Government Accountability Office [GAO], 2008a). Although the rapid growth of trade and freight volumes has been temporarily interrupted by the severe worldwide economic downturn, most observers expect trade volumes to come back strongly as the economy recovers. In fact, even as manufacturing employment plummeted in the past decade, overall labor productivity and the volume of goods produced increased (NCHRP, 2008).

The U.S. supply chain network, which moves this rapidly expanding volume of trade, is composed of multiple modes as well as diverse shippers and suppliers operating along water, air, and land routes and governed under myriad regulatory regimes. Trucks, rail, airplanes, barges, and sea-going ships often compete for freight shipments in key markets or along specific corridors. Many technological, production, and legislative actions—and changes in these factors over time—directly or indirectly affect the competiveness of individual freight modes, sometimes in important ways that are not always clear or predictable.

There have been remarkable changes throughout this complex supply chain network in the past few decades. In addition to the
increasing volume of trade (particularly from abroad), the rapid growth of home shopping and e-commerce, major changes in industry production processes, and the proliferation of large scale-warehousing and distribution centers also have generated new and different demands on the nation’s supply chain network (Ortiz et al., 2007; Hillestad, van Roo, and Yoho, 2009; NCFRP, 2011b).

All of these factors create substantial challenges for the United States, challenges that may well compromise the productivity and competitiveness of the entire U.S. economy. The most conspicuous is the growing gap between increasing demand and an aging transportation network, resulting in rapidly worsening congestion. The Texas Transportation Institute reported that in 2009 American truck congestion alone cost $33 billion in wasted fuel and lost time, or 29 percent of the total direct costs of U.S. congestion (Shrank, Lomax, and Turner, 2010). The majority of these costs are passed on to consumers in the form of higher prices.

Although capacity constraints that lead to congestion are the most visible of the problems in the supply chain network, other factors significantly contribute to congestion as well. Most shippers and businesses are not encouraged or required to make more efficient use of the existing network or to choose the most competitive freight mode, because they do not incur all the costs that their travel patterns and business practices generate (National Surface Transportation Policy and Revenue Study Commission, 2007; Transportation Research Board [TRB], 2009; National Cooperative Highway Research Program [NCHRP], 2009). In fact, the U.S. Department of Transportation (DOT) has estimated that the nation could save $20 billion each year in infrastructure expenditures alone if travelers were charged fees in relation to the costs they imposed on the system (Federal Highway Administration [FHWA], 2007, pp. xl, ES-20).

While the U.S. freight network needs billions of dollars to maintain (let alone expand) current infrastructure, traditional funding sources are woefully inadequate to meet those needs. Moreover, using current funding mechanisms may not be the most efficient and effective way to raise additional funds, even if it were politically possible
to do so (National Surface Transportation Policy and Revenue Study Commission, 2007; TRB, 2009; NCHRP, 2009).

Infrastructure needs are exacerbated by regulatory barriers, inefficient pricing policies, and the inability of planners and policymakers at various levels of government to adequately respond to growing problems in the freight network. Those dealing with freight issues often lack comprehensive and timely data on freight movements and have limited institutional capacity to address large, complex, and multijurisdictional freight projects.

There is substantial consensus that the federal government should play a greater role in addressing these serious problems in the freight network—but there is far less agreement on exactly what the federal role should be or the kind of projects that deserve or require federal assistance. While the costs of congestion can be aggregated to create a total national dollar figure, many of those costs are not borne outside the areas in which they are generated. Moreover, a substantial share of freight movement is local and regional; for example, the majority of freight vehicles on the roads rarely travel more than 50 miles per trip or outside their own metropolitan area, let alone their state. And the overwhelming majority of truck freight movement is not on interstate highways (FHWA, 2010, Tables 3-5, 3-6, 5-8, 5-9).

While industry groups have long called for major federal responses to problems in the U.S. freight network (American Association of State Highway and Transportation Officials, undated; Cambridge Systematics, Inc., Boston Logistics Group, Inc., and Alan E. Pisarski, 2008; Lind, 2009), other analysts have called for more limited federal responsibility (Ortiz et al., 2007; GAO, 2008a; TRB, 2009). There is, however, general agreement that the federal government does have some role (National Surface Transportation Infrastructure Financing Committee, 2009; TRB, 2006, 2009; GAO, 2005, 2008a, 2008b; TRB, 2011).

Most stakeholders and analysts agree that a new federal freight policy should meet six objectives:

- Improving freight planning efforts.
- Provide some financial assistance to local freight and intermodal projects with sustainable revenue sources.
- Condition federal support on specific performance measures.
• Require supported projects to have substantial user-pay components.
• Reform regulatory barriers.
• Respond to situations where the market alone will not bring about the best solution.

This monograph describes four potential policy elements of a federal freight strategy that responds to these six widely agreed-on objectives, addressing crucial problems in the U.S. supply chain network. Although there are many modes in the U.S. supply chain network, we focus largely on truck travel, because the highway network is the focus of surface transportation legislation on which we seek to provide elevation. In addition, trucks are the most ubiquitous freight mode, carrying over 90 percent of all freight at some point in the supply chain. Prices and practices in the trucking industry ripple through the freight network. Thus, this monograph only marginally addresses a variety of changes in other freight modes.

The first suggested policy element is a federal capital assistance program that depends on specific and sustainable revenue sources and incorporates measurable performance criteria while recognizing that most major freight infrastructure projects will confer substantial local and even private-sector benefits. This element uses an elaboration of traditional benefit-cost analysis to permit analysts to disaggregate project costs and benefits by location, stakeholder, and level of government. Ultimately, this allows the federal government to identify a share of project costs and resources that roughly corresponds to the national benefits of major freight projects. In turn, this permits the federal government to make federal assistance proportional to the national share of benefits from economically efficient infrastructure projects.

The second suggested element evaluates contested regulations to determine whether changes or reform would improve the efficiency and competitiveness of various freight modes in the overall system. The third element focuses on the potential of various pricing strategies, and particularly greater use of user-based pricing, to regulate congestion and to provide sustainable revenue sources—two objectives that are not always compatible. The last element targets data and informa-
tion gaps, training needs, and institutional capacity problems at all levels of government, problems that inhibit appropriate consideration of freight issues.

This monograph has six chapters. Chapter Two provides background on the challenges faced by the national freight network and describes the complex nature of congestion, only some of which is due directly to capacity constraints. Chapter Three describes current federal freight programs and policies and discusses six major objectives many stakeholders and analysts posit for a new federal freight policy.

Chapter Four, which is the heart of the monograph, outlines four policy elements for a potential federal freight strategy. The approach is designed to determine an appropriate federal role in local freight projects based on a modified version of traditional cost-benefit methodology. This involves a four-step process that evaluates the freight projects in which the federal government could invest, the ways in which the federal government should provide assistance, and the appropriate type and level of federal financial assistance. Chapter Five describes how the various elements of this policy can be paid for, and Chapter Six summarizes the key points and reiterates the value of the approach suggested here.
The Challenges Faced by the U.S. Supply Chain Network

A number of factors together place unprecedented demands on all elements of the U.S. freight network. Freight volume has increased with population and economic growth (even in the recent economic downturn); moreover, there has been substantial growth in international trade as well. Truck traffic on the nation’s highways is projected to double by 2030, while waterborne shipments will increase by almost a fourth (NCFRP, 2009).

Moreover the nature of the national (and international) supply chain network has changed dramatically over the past 40 years. Today, global supply chains are managed using sophisticated technological links, freight facilities are often automated and computerized to meet “just-in-time” manufacturing demands, and many intermodal facilities are now owned or managed by third-party providers, which allows substantial cost savings through shared use and economies of scale (NCFRP, 2009; Cidell, 2010).

Growing gaps between the changing and expanding needs of the U.S. freight system and the freight infrastructure network often manifest as congestion—along highway corridors, at intermodal facilities, at ports and railheads, and along inland waterways. An NCFRP report (2010b) noted,

Increasing freight demand and capacity constraints present several challenges to maintenance and operation of the freight transportation system. Recent studies and statistics document the inad-
equate capacity and resulting increasingly costly congestion—not only at the nation’s highways but also in metropolitan areas, at water ports, railroads, airports, and intermodal facilities. (p. 1)

Congestion costs American travelers, consumers, and businesses billions of dollars each year through a combination of wasted time and money, reduced productivity, decreased reliability, the need to duplicate delivery efforts, and manufacturing disruptions (Hillestad, van Roo, and Yoho, 2009; TRB, 2009; Shrank, Lomax, and Turner, 2010). The FHWA reported that in 2006 freight carriers incurred 226 million hours of delay just at the 40 major bottlenecks in the United States; the direct cost of that delay was estimated at over $7.3 billion per year (Cambridge Systematics, Inc., 2008).

Congestion costs are highest in the biggest urban areas; in 2009, the 15 largest urban areas in the United States averaged over 12 million hours of truck delay, for an average cost to each urban area of almost $1.3 billion. This ranged from a high of 31.7 million hours of truck delay in Chicago to 4.3 million in San Diego (Shrank, Lomax, and Turner, 2010, Table 5, p. 38). Trucks in even the 22 smallest urban areas in the United States lost on average almost 300,000 hours in 2009 due to congestion, at an average cost to each small urban area of $31 million dollars (Shrank, Lomax, and Turner, 2010, Table 5, p. 41). As the GAO (2008a) has noted,

Strong productivity gains in the U.S. economy hinge, in part, on transportation networks working efficiently. . . . However, the increasing congestion within the freight transportation system poses a threat to the efficient flow of the nation’s goods and has strained the system in some locations. . . . Congestion delays that significantly constrain freight mobility in these areas result in serious economic implications for the nation. (p. 1)

The costs of congestion force producers and freight operators to behave in ways that may be rational in the short term but further reduce their productivity and competitiveness over time. They may move production facilities out of congested urban areas, limit the markets that they serve or the products they offer, miss opportunities for
new investments, and increase costs by warehousing larger inventories or dispatching additional trucks to ensure reliability in the face of congestion (GAO, 2008a; Hillestad, van Roo, and Yoho, 2009; Cidell, 2010). Congestion in one freight mode can cause shippers to shift to other modes, even if doing so does not produce the most efficient long-term outcome (Thoma and Wilson, 2007). DeVuyst, Wilson, and Dahl (2009) found that delay costs on barges shift freight movements not only to other freight modes (usually rail) but also to different origins and ports.

The Nature of Congestion

Congestion is a complicated phenomenon. Most discussions focus on recurring congestion of long duration at points where capacity is constrained, such as along major highway or other freight corridors, at bottlenecks, or at ports and intermodal transfer facilities (NCFRP, 2010b). Bottlenecks often occur on steep grades or at points of reduced capacity, most commonly at freeway/highway interchanges or where lanes are “dropped” (e.g., when a roadway narrows from three to two lanes). Some point congestion results from poor infrastructure maintenance and geographic limitations on infrastructure expansion (GAO, 2008a; TRB, 2009).

But there are other important types of congestion. A 2007 RAND study found that substantial freight congestion is both random and short-term in duration, caused by sporadic bad weather, crashes, random cargo inspections, loading and unloading delays, the impact of labor work rules, and conflicts over implementation of regulatory policies (Ortiz et al., 2007). Delays at border crossings, labor disputes, security procedures, the need to alter behavior to reduce adverse community affects (e.g., limiting local deliveries to certain hours), and the impact of a range of freight regulations (e.g., safety, customs procedures) all create freight congestion of varying duration (NCFRP, 2010b).

An FHWA report (Cambridge Systematics, Inc., 2008) paralleled the RAND findings, concluding that traffic incidents (crashes, etc.) account for 25 percent of all congestion. Bad weather, work zones, poor
traffic signalization, and special events account for another 30 percent of all congestion. Conversely, recurrent point congestion, usually at so-called bottlenecks, accounts for only 40 percent of all traffic congestion. Thus, while intrinsic capacity constraints are the single largest source of traffic congestion, they do not cause the majority of that congestion.

Congestion also arises because pricing policies do not link the costs of congestion to the prices that various users pay for the transportation system. Thus there is little incentive for producers and shippers to avoid congested routes or areas, to travel outside peak periods, or to use other freight modes that are not congested (NCFRP, 2010c; TRB, 2009; National Surface Transportation Infrastructure Financing Committee, 2009). While we do not know how much or how often firms, producers, and shippers can or will alter their behavior, they are unlikely to even consider doing so until and unless they are required to pay for the costs they impose on others when utilizing congested facilities or less efficient shipping modes.

However, because the freight system is a network with many interrelated components, increasing user charges and fees alone may not bring desired reductions in congestion. One study concluded that charging shippers for traveling in congested areas or at congested times would not change shipper behavior unless freight recipients (both households and businesses) agreed to accept shipments at nontraditional times (Holguín-Veras, 2008).

Ultimately, congestion is a complex occurrence with many attributes and causes. While the most common type of congestion (point congestion) reflects intrinsic physical capacity constraints, other causes together account for the majority of congestion. Several research studies show that a meaningful share of congestion occurs because regulatory and pricing policies do not encourage efficient behavior or penalize inefficient business practices.
CHAPTER THREE
What Is the Federal Role in Freight Transportation?

The overwhelming majority of problems in the nation’s freight network occur at the local level, and most costs are largely borne locally. This means that addressing congestion will likely create substantial local benefits, even if some benefits will spill over to adjacent jurisdictions or even the nation as a whole. Given the complicated causes of freight congestion and other problems in the supply chain system, and the major involvement of the private sector, what responsibility does the federal government have for freight issues?

Existing Federal Responses

To most stakeholders, freight problems seem to be the least important federal transportation issues—they get little attention or funds. In general, neither Congress nor the executive branch has focused significant attention or funds on freight problems. Congress has indirectly dealt with the needs of the freight network in the past in a number of federal highway bills that, over three decades, have attempted to identify “nationally significant corridors.” While not specifically designated for freight, identifying corridors having national significance builds on the federal role in facilitating interstate commerce because it complements the ways in which freight movements play out spatially.

Figure 3.1 shows how freight received at the Ports of Los Angeles and Long Beach is carried on major highway corridors spanning the
Figure 3.1
Depiction of How Freight Received at the Ports of Los Angeles and Long Beach Moves Across the National Highway System

[Map of the United States showing network flows and port to state flows in different tonnage categories.]


nation. Figure 3.2 shows the major highway routes along which total truck freight across the country (regardless of origin) is carried. Both figures suggest that a substantial quantity of freight is moved on long, defined highway corridors, usually on the interstate system. But these kinds of maps can be misleading, since a substantial amount of that freight traffic moves very short distances on those corridors.

In fact, FHWA data show that in 2008 only 26 percent of all truck freight traffic moved on interstate highways at all: 49 percent of the mileage of larger [combination] trucks, 21 percent of the mileage of single-unit trucks, and 22 percent of the mileage of the remainder of freight trucks and vans (FHWA, 2010, Table 3-5). This is because most truck trips are short; in 2002, roughly one-half of freight trucks typically traveled 50 miles or less from their home base, and three-
fourths stayed within their own state. Only 10 percent of trucks typically traveled more than 200 miles from their base. Single-unit freight trucks, which account for over three-fourths of all registered freight trucks on the road, only traveled an average of 12,362 miles total in 2008—which equates to 34 miles per day in a seven-day work week or 48 miles per day in a five-day work week (FHWA, 2010, computed from Tables 5-8 and 5-9). At the same time, trucks that FHWA labels “long-haul” typically serve locations at least 50 miles apart; those that traveled over 200 miles from their home base accounted for 30 percent of total freight vehicle mileage (FHWA, 2010, Table 3-6).

Because so much truck traffic moves along defined major corridors, beginning in 1991 Congress began designating priority corridors within the National Highway System. At the beginning of 2006,
more than 80 high-priority corridors had been designated by federal transportation legislation (the Intermodal Surface Transportation Efficiency Act [ISTEA], Pub. L. 102-240; the Transportation Efficiency Act [TEA-21], Pub. L. 105-178; and the Safe Accountable Flexible Efficient Transportation Equity Act: A Legacy for Users [SAFETEA-Lu], Pub. L. 109-59).

Some of the designated corridors are subsections of larger or longer corridors. Some are entirely within one state, such as the Urban Highway Corridor along M-59 in Michigan or the Birmingham (Alabama) Northern Beltline. Others cross multiple states, such as the East-West Transamerica Corridor from Virginia through Kansas. Some corridors are along essentially completed highways, while others are along anticipated future highways. Each successive reauthorization of transportation funding legislation has created financing programs to assist development in some or all of these designated corridors.

Defining priority highway corridors, however, does not deal with other freight corridors, such as inland waterways, pipelines, or rail corridors. And, just as significantly, it is hard to see in these statutes what specific standards or criteria Congress used to define a nationally significant freight or highway corridor. Failing that, it is hard to identify congressional views of the parameters of the national interest in the freight network or judge how local freight projects should be chosen as appropriate candidates for federal funding (GAO, 2008b, 2009).

Some existing federal funding programs technically can be used by state and local governments to fund freight infrastructure and/or planning for such efforts. For example, Congestion Mitigation and Air Quality (CMAQ) funds from the federal-aid highway programs can and have been used to pay for freight improvements. Yet even programs for which freight projects are eligible have not been frequently used to address problems in the freight network (GAO, 2008a).

There are a number of reasons for the failure of current federal funding programs to be used for freight projects when it is possible to do so. The GAO (2008a, 2008b) concluded that the competition for funds between and among grant programs is fierce, and freight projects are often not highly valued locally. In addition, GAO (2008a, 2008b) found that many freight projects are intermodal or multimodal, while
most funding programs are “stovepiped” or structured to aid one specific mode (i.e., public transit or highways). Moreover, freight projects often generate substantial community opposition; while they may ultimately reduce congestion and pollution, local communities often see only the negative impacts of more freight moving near or through their neighborhoods.

At the same time, the federal government and the Cooperative Research programs of the Transportation Research Board (directly or indirectly funded by the states and the federal government) have taken major steps to address some of the freight data and skills needs of state and local planners. The FHWA has ongoing programs to improve data on freight movements, to increase the awareness of local planners of the importance of freight issues, and to develop tools that assist local and state governments to determine the economic value of proposed freight policies. The NCFRP was created in 2008 to conduct research on a number of the topics raised here.

But almost all stakeholders and analysts believe that there is a need for substantially more federal attention to a wide variety of freight needs, especially given the serious limitations of current federal transportation programs.

**Demands for Federal Action**

Most analysts and stakeholder groups have concluded that there is a role for the federal government in addressing problems in the U.S. freight system. At the core of major debates, however, are questions about how often, how much, how, and with what sources of funds the federal government should respond. Many industry groups and analysts have argued that the federal government should make substantial efforts to address freight issues. The American Association of State Highway and Transportation Officials (undated) asserted that,

> Unless America takes direct action soon to develop [a] New Interstate Highway System, the nation’s freight highway network will experience greater unreliability, delay, and congestion. Incremen-
tal changes will fall far short of the necessary investment needed to reverse these trends. (p. 21)

Many freight stakeholders, particularly in the private sector, argue that the federal government must intervene aggressively to maintain national productivity and increase American competitiveness. Michael Lind, writing in the December 2009 issue of *McKinsey Quarterly*, commented,

. . . the low cost and reliability of freight transportation in the United States have been critical to the country’s economic success. But America’s failure to modernize its overloaded freight transportation infrastructure—chiefly the railroad network and highways used by trucks, but also inland waterways, ports, and airports—is imposing costs on American efficiency. As a result of congestion (highway delays, for instance), the penalty on American growth exacted by logistics costs rose from 8.6 percent of GDP in 2003 to 10.1 percent in 2007, even before the crisis [the current downturn in the economy].

Robert Poole and Adrian Moore of the Reason Foundation, which has called for reduced federal funding of a variety of transportation-related activities, find that freight activities are worthy of federal assistance (Poole and Moore, 2010). Calling the urban interstates “the lifeblood of goods movement” (p. i) Poole and Moore conclude that commerce and international trade are clear federal responsibilities and should “be at the core of a rethought federal role” in transportation.

But these are not consensus views. RAND studies (Ortiz et al., 2007; Hillestad, van Roo, and Yoho, 2009) and a 2009 Transportation Research Board study (2009) have concluded that since most freight problems are local or regional in nature, their solutions should largely be fashioned and paid for by state and local governments.

While analysts and stakeholders vary widely in what they think the federal government should do, when, how, and with what sources of funds, most discussions of a federal role in the freight network focus on the following six major objectives:
• Improve freight planning at every level of government by improving freight data, disseminating best practices and promising approaches, and increasing institutional capacity.
• Provide federal financial assistance to appropriate freight projects based on justifiable and sustainable revenue sources.
• Condition federal assistance to freight projects on specific and measurable performance criteria.
• Require any federally supported freight projects to have a substantial user-pay component.
• Reform regulations that inhibit the competitiveness of various freight modes or inhibit the active involvement of the private sector in freight projects.
• Respond to market failures, such as the lack of cooperative efforts, and positive and negative externalities from freight projects.

The rationale underlying each of the six policy objectives is discussed below. The four major policy elements that form the core of this monograph are together designed to collectively address these six policy objectives. Chapter Four describes the four suggested policy elements and indicates how each meets one or more of these objectives.

Improve Freight Planning at All Levels of Government
Many analysts, most notably the GAO, have noted a serious need for:

• systematic freight data on multiple modes over multiple time frames at different geographic levels
• research on and dissemination of best practices and promising approaches to a variety of freight problems and issues
• enhanced institutional capacity to deal with freight issues at all levels of government.

Freight Data Needs. A recent NCFRP report (2011a) noted that to address the challenges to the nation’s freight network,

It is important to have accurate, comprehensive, and timely information to make sound investment decisions to improve and optimize the freight transportation system. A large number of stake-
holders need access to freight transportation data. . . . federal, state, and local level transportation planning agencies require freight transportation information to identify operations and infrastructure improvements. . . . Likewise, the private sector requires accurate, timely information about the characteristics and operating conditions of the transportation network. (p. 1)

A 2011 NCHRP study that surveyed a wide variety of agencies at many levels of government reported that all respondents experienced serious shortcomings in freight data, whether the agencies collected data themselves or received them from external sources. Respondents felt that the freight data they had available were too old or inadequate to address freight or commodity movement at the detail or geographic scale or for the freight mode(s) for which they were planning. The study concluded that many public agencies needed detailed guidance on how to (1) conduct freight surveys, (2) improve methods of surveying providers to ensure clarity and accuracy in responses (while increasing response rates), and (3) address legal and confidentiality issues in data collection from private operators (NCHRP, 2011a).

An important problem is that so much of the needed data are proprietary, because so many freight stakeholders are private firms. A 2008 NCHRP report commented that “A critical gap continues to be the ability to collect data from shippers or carriers that are reluctant to divulge confidential information. The only substitute to date has been to purchase private data that have been cleaned and protected in a such a manner as to minimize disclosure” (p. 4).

The NCFRP (2011a) study concluded that the federal government has a role in establishing a national freight transportation data architecture as a way to link existing freight data sets and guide new data collection. This kind of federal response could overcome the fact that existing data sets are difficult to use or to link together because “they are collected under various definitions and time scales, geographic levels, and aspects of transportation” (p. i).

A 2011 TRB report on national passenger and freight data needs came to similar but more emphatic conclusions. The report noted that
Increased globalization and continued growth of the service economy have changed shipping, logistics, and supply chain patterns in ways that are not captured by current freight data surveys or at geographic levels (i.e., market areas) useful for network planning and management and economic analysis. (p. 17)

A major study finding is that the gaps in freight data are so critical that they can only be filled “with a reorientation in approach” (in contrast to their more marginal recommendations for passenger travel data) (p. 36). The report noted that national data on freight flows are not aligned with the supply chain orientation of the industry, while existing data-collection efforts only poorly cover crucial issues, such as connecting freight shipments from their origin to intermediate locations (such as warehousing) to their final destination. According to the report, without such data, it is impossible to address foundational questions—what businesses ship, why, and where.

Many analysts have also identified a complementary need to develop or improve existing freight planning tools and models (since good data and good models go hand in hand) (NCHRP, 2008). A GAO report (2009) found that the transportation models widely used by metropolitan planning organizations (MPOs) could not respond to complex policies, such as freight movement.¹ Other studies have come to similar conclusions (Anderson, Harris, and Harrison, 2010).

**Conducting Research on Best Practices and Promising Approaches.** Many analysts have found that stakeholders often lack basic information on best practices and promising low-cost techniques for solving local and regional freight issues. An NCFRP report (2010b) found that many local or regional agencies, often in collaboration with private stakeholders, had developed fairly small-scale responses to a wide array of local freight congestion problems and bottlenecks. But the study reported that no one had systematically inventoried the success of such efforts, evaluated their transferability, or widely disseminated the results to other jurisdictions or agencies that might be

¹ In contrast, an NCFRP study (2010a) reported that most MPOs felt that their transportation models were adequate to address freight issues but that they lacked adequate and timely freight data to use in those models.
interested. While the NCFRP and NCHRP have made some efforts in these areas, they themselves call for more freight research, data collection and synthesis, and dissemination of all those products (NCHRP, 2010a, 2011a; NCFRP, 2010b, 2011a, 2011b).

In a similar vein, the FHWA concluded that many freight congestion and capacity problems could be addressed by adopting a combination of operational measures that improve both signalization and the ways in which localities handle traffic crashes, bad weather, and emergencies (Cambridge Systematics, with Texas Transportation Institute, 2004). Yet Hillestad, van Roo, and Yoho (2009) note that information about these kinds of noncapital approaches to freight problems is limited. GAO (2008a) concluded that many public agencies do not have enough information to analyze potential alternatives for resolving freight problems.

In addition there are a number of policy areas where we lack research or operational experience; they range from the actual response of truck drivers to comprehensive pricing strategies to the public response to heavier trucks operating on the interstates. Many individual states and MPOs have expended their own resources to develop information on these issues, but doing so on a state-by-state (or city-by-city) basis is not efficient. This is, in part, because efforts will be duplicated. But, more importantly, individual agencies are unlikely to see value in critically evaluating their outcomes or widely disseminating their findings even if they did. For example, an NCFRP (2010b) report noted that since the mid-2000s the Ohio Department of Transportation has produced more than 700 “quickly implementable” and low-cost freight projects, but most of these measures are not well studied nor known outside the state.

Moreover, there is limited information on a number of widely discussed freight projects, such as CREATE (Chicago Regional Environmental and Transportation Efficiency Program) in the Chicago region or the Heartland Corridor (a rail project from Virginia to Chicago briefly described in TRB 2009). In fact, while often described as “successful,” neither of these projects has been objectively evaluated, nor have they been studied to identify their transferable lessons or elements. While they may be as successful as often claimed, the lessons
of their success are only available at the most general level to other jurisdictions.

GAO (2008a) concluded that many public agencies do not have enough information to analyze the feasibility of potential alternatives to freight problems in their own jurisdictions. For example, a TRB (2009) freight financing report noted that the success of the Alameda Corridor in Southern California (a somewhat better studied project) depended on the active role of the port authority but that “In other locales, governments may lack the interest or resources to take on the lead role . . .” (p. 30).

Many of these information gaps cannot be filled by individual jurisdictions; some may require large-scale demonstration projects. Because of the costs and the risks involved, it is unlikely that industry stakeholders or local or state governments will be willing to fully finance or fund the kinds of major research efforts or pilot and demonstration projects that might be needed to provide comprehensive information on promising freight approaches. Nor are they likely to be willing or able to synthesize and widely disseminate the results of the projects that have been undertaken.

**Increasing Institutional Capacity to Address Large-Scale Freight Problems.** An NCHRP study (2010a) concluded that states and MPOs often do not have the skills to conduct necessary planning tasks crucial to freight planning. For example, staff often lack the tools and experience to conduct the corridor planning needed to facilitate multistate efforts, engage a wider variety of relevant stakeholders, and provide a more direct link between the movement of people and goods.

Local, MPO, and state agency staff may also be unfamiliar with or inexperienced in conducting detailed and sophisticated economic analyses of large-scale, interjurisdictional, or intermodal projects with multiple beneficiaries (GAO, 2005, 2008a; TRB, 2009). This limits their ability to link project approval to performance standards, evaluate the economic efficiency of proposed projects, compare economic efficiency outcomes with other project goals (such as equity), or fairly distribute costs among potential beneficiaries.

Experts at a roundtable organized by the GAO (2005) noted that even if public agencies hire outside firms to conduct economic analyses
of freight policies and projects (to overcome the lack of institutional expertise), it is crucial that agency staff understand the strengths and weaknesses of various techniques and the limits of their application. An important federal role might be to develop appropriate training programs and materials to address the lack of institutional capacity to address complicated freight issues.

**Provide Federal Assistance to Appropriate Projects with Sustainable Revenue Sources**

Many freight stakeholders advocate a major federal role in providing financial assistance to maintain and expand highway, rail, inland shipping, and port facilities. They argue that these expenditures could reduce congestion and increase reliability, thus cutting costly productivity losses and increasing system reliability. In March 2010, William R. Beuchner, vice president of the American Road and Transportation Builders Association, proposed a new federally funded freight system in testimony before a Senate subcommittee, because,

There is a massive gap between our nation’s highway investment needs and the level of federal highway investment. For decades, the federal highway program has financed about 45% of all highway investments in the U.S., with state and local governments providing the rest. But neither side is doing what is needed. . . . (Beuchner, 2010, p. 11)

Enactment of a multi-year surface transportation authorization bill that significantly boosts federal highway and public transportation investment is one of the best steps Congress can take to promote job creation and economic strength . . . (p. 17).

Various stakeholders have estimated the costs of building and maintaining sufficient infrastructure to overcome freight congestion at somewhere between $132 and $262 billion per year (The U.S. Treasury and the Council of Economic Advisors, 2010). A study done for the U.S. Chamber of Commerce estimated that it would cost $50 billion per year to simply maintain the current level of the nation’s highway and transit systems, and $100 billion annually to improve them
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(Cambridge Systematics, Inc., Boston Logistics Group, Inc., and Alan E. Pisarski, 2008). The study found the nation would have to spend an additional $125 billion just to replace the locks on the inland waterway system and another $148 billion to allow American railroads to keep pace with forecasted growth in freight.

But the federal government’s ability to provide additional capital and other assistance to freight projects is limited by harsh budgetary realities. The federal share of the costs of the U.S. surface transportation system has long been financed by fuel excise tax revenues (which act to some extent like user fees), plus sales taxes and user fees on heavy vehicles and tires, an indirect way to charge heavy vehicles for their disproportionate impact on highway infrastructure (TRB, 2006).

Over time, however, federal excise taxes on gasoline and diesel fuel and sales tax revenues have not kept pace with costs (nor continued to serve as good proxies of the costs users impose on the network, an issue discussed in a later section). The federal excise tax on gasoline has not been raised since 1993, although costs have increased substantially since then. Moreover, truck and tire sales (and thus sales tax revenues) have dropped dramatically in the past few years. Recently, the shortfall caused by the gap between revenues that feed the Highway Trust Fund and mandated expenditures from the Highway Trust Fund has necessitated transfers from the General Fund of the United States.

Given these realities, GAO (2008a, 2008b), among others, has concluded that we need a new federal approach to funding highway, transit, and various freight improvements (National Surface Transportation Policy and Revenue Study Commission, 2007). Almost all stakeholders couple their demands for increased and targeted federal assistance with suggestions of alternative funding sources. These range from raising various components of federal fuel taxes (i.e., gasoline and diesel) and excise taxes to using greatly expanded road pricing and tolling (American Road and Transportation Builders Association, 2007; National Surface Transportation Policy and Revenue Study, 2007; TRB, 2006, 2009). But almost all analysts and advocates argue that new federal programs must ensure that the right projects are funded and that the source of funds for these new programs must be identified and justified (TRB, 2006, 2009; GAO, 2008a).
A TRB policy study (2009) of freight financing strongly recommended that a national freight policy ensure that federal funds augment rather than replace state and local funding. For example, GAO in 2004 noted that roughly half the increases in all federal grants between 1982 and 2002 reduced the funding levels of the recipient governments, and that this substitution increased in the 1990s. At the same time, a later GAO (2008a) report found that state and local governments have been funding an increasing share of all transportation expenditures and now account for $4 out of every $5 spent on the surface transportation network.

**Require Funded Projects to Meet Specific Performance Criteria**

Many analysts, most notably the GAO (2005, 2008a, 2008b), have long commented on the lack of explicit performance criteria in the processes by which federal (or state) financial assistance is awarded to freight (and other transportation) projects. These critiques actually have multiple strands. The first is a concern that there is no coherent and explicit national freight (or transportation) policy that specifies the specific federal goals and objectives that should guide federal freight funding decisions (GAO, 2008b; TRB, 2009):

Many [transportation] programs are not effective at addressing key transportation challenges such as increasing congestion and growing freight demand because federal goals and roles are unclear. . . . The goals of federal surface transportation programs are numerous and sometimes conflicting. (GAO, 2008b, pp. 3–4)

A second strand is that we rarely calculate how important various freight projects would be to the country—as opposed to estimating the costs of the lack of action. For example industry stakeholders have noted the need for performance measures that calculate the direct and indirect benefits of funded projects to the nation as a whole, largely as a way to support and defend additional capital investments in freight (U.S. Chamber of Commerce, 2010).

A third strand is the concern that even if projects seem to address national policy goals (perhaps inferred from federal legislation), they may not be economically efficient—that is, even if they address con-
gestion or environmental protection or national security goals, their real benefits do not exceed their costs. In a number of reports over the past decade, GAO has called for an economic assessment of federally funded projects; these reports do not explicitly call for traditional benefit-cost analysis, but that appears to be their meaning (GAO, 2005, 2008a).

A benefit-cost analysis (BCA) is, at its simplest, the identification and comparison of all project costs and benefits that can be monetized (that is, that come in dollar increments or can be converted to dollars). Then the benefits are divided by the costs, and the result is usually a single benefit-cost ratio. Ratios over 1.0, where benefits exceed costs, are said to be economically efficient because society would be better off spending the funds than not doing so. BCAs can also compute the net dollar benefit of various projects, thus giving an idea of the magnitude of the benefits (or costs). A project with a high benefit-cost ratio can involve only a small amount of savings or benefits, while another project with a lower ratio may deliver a much higher net dollar benefit. Thus, the use of both BCA measures may be important in decisionmaking.

BCAs have well-recognized problems. A BCA evaluates only one outcome of a project: economic efficiency. And it does so only to the extent that important costs and benefits can be identified, measured, and ultimately monetized. Moreover, BCAs say nothing about who should pay for what. The most frequent criticism is that many important societal costs and benefits are hard or impossible to quantify, let alone monetize—examples include aesthetics, environmental protection, and community cohesion (OECD, 2006).

Another serious criticism is that BCAs can be manipulated by analysts through a number of internal assumptions that may not be obvious to the public or policymakers. Analysts must choose a time frame over which to measure costs and benefits, a discount rate to account for the fact that in most cases people prefer to spend a dollar today than wait to spend three dollars a decade from now, and an inflation rate to account for rising costs. Through these choices, an analyst can make a potential project seem more or less efficient (Fuguitt and Wilcox, 1999). Moreover the ways in which difficult-to-monetize costs
are handled, such as preserving species habitat or protecting community social capital, may not be obvious to the public or decisionmakers.

In addition, BCAs do not traditionally give priority to certain net benefits over others (safety versus productivity, for example) nor evaluate the importance of user contributions (i.e., whether some costs are more likely to be offset by user charges). BCAs traditionally do not consider whether costs are distributed in ways that have equity implications (for example, if most costs are borne largely by low-income travelers but most benefits accrue to those who are wealthier).

Moreover, as discussed in an earlier section, many agencies lack the skill to undertake such analyses. Even if they hire outside analysts, agency staff may not fully grasp what costs and benefits have been included—and which have been left out. They may not realize how nonmonetary costs have been monetized (or not). In addition, it is not clear that federal agencies reviewing project proposals based on BCAs and related economic analyses currently have the skill to understand the intricacies of these approaches.

In an effort to address at least some of these issues, many economists have moved beyond traditional approaches and have developed ways to weight costs and benefits to reflect policy and other externally determined standards (Sunstein, 2004; GAO, 2005; OECD, 2006; van Wee, 2008). Later in the monograph, we suggest some ways in which BCAs could be used to not only gauge potential performance of projects seeking federal assistance but to divide costs fairly among users and beneficiaries.

However, doing a BCA requires special skills that often are not available in agencies dealing with freight issues. As a result, such agencies often “outsource” the work; this has both advantages and disadvantages. On the plus side, a well-done analysis gives decisionmakers important information that they can combine with other measures to make decisions that meet multiple goals. On the negative side, the multiple assumptions made by the consultants undertaking the work, as well as how influential certain assumptions or the use of data proxies were in the outcome measures, may not be clear to local officials or the general public.
Finally, a fourth strand of this debate is that federally funded projects are not evaluated after they have been completed to prove that they provided the promised benefits. At a minimum, this means that the federal government cannot know if giving additional assistance in the same way is cost-effective. It also means that other areas lack good information on the transferability or actual potential of various infrastructure projects or approaches (GAO, 2005).

Given all these issues, many analysts have called for a coordinated federal transportation and freight policy that has explicit performance goals and objectives and provides methods to ensure that federally funded projects perform in ways that meet one or more of those objectives, using cost-effective and efficient approaches. At the same time, critics, such as Robert Pool and Adrian Moore (2010) of the Reason Foundation, have expressed doubt that Congress will ever be able to fashion a national policy with such standards because the process is inherently political. However, while setting goals and then ranking them is an inherently political process, it is possible to imagine a performance-based selection process that requires project applicants to prove that they meet highly ranked political goals in an economically efficient manner.

**Condition Federal Support on Substantial User-Pay Components**

Almost 90 percent of federal surface transportation expenditures have traditionally come from federal fuel excise taxes and taxes on heavy truck and tire sales, revenues sequestered in the national Highway Trust Fund. Because funds from the Highway Trust Fund are generally restricted to expenditures on surface transportation improvements, this mechanism has traditionally created a highway system (designed to be) financed by the users themselves (National Surface Transportation Infrastructure Financing Committee, 2009). Almost all analysts have concluded that the user-pay *principle* must continue to be the foundation of financing freight and transportation infrastructure improvements, even if we can no longer rely mostly on fuel excise taxes.

The emphasis on the user-pay principle has two not-always-compatible goals. The first is to increase system efficiency by ensuring that the prices users pay reflect the costs of the services they receive
or the costs that they impose on the freight system. The second is to create a sustainable source of revenue to build and/or maintain freight infrastructure.

**Improving System Efficiency.** The efficiency claims for pricing are many. The first is to realign prices and fees with actual system use. The major user-based revenue sources that feed the Highway Trust Fund are not as directly linked to system use as they were in the past. Costs have risen substantially, whereas most of these revenue sources have not, largely because of unwillingness to raise taxes. Moreover, traditional revenue sources do not appreciably charge users for the congestion they cause or the full damage their vehicles do to the transportation system. The National Surface Transportation Policy and Revenue Study Commission (2007) noted that congestion often leads to demands for expensive new infrastructure to meet peak demand even though there is often excess capacity during other hours of the day. Recent transfers from the General Fund to the Highway Trust Fund to deal with revenue shortfalls have also effectively broken the user-pay link. In contrast, pricing travelers for their use of various facilities could encourage businesses, truckers, and shippers to avoid congested travel times or areas or to ship via more efficient freight modes (GAO 2008a, 2008b, 2009, 2011; TRB, 2009; Hillestad, van Roo, and Yoho, 2009). Ultimately, this might significantly lower congestion along certain routes or at intermodal transfer points and thus reduce the need for maintenance as well as new capacity.

In addition, adjusting regulatory prices would even the playing field between various freight modes. Wilson (1996) concluded that removing certain federal regulations on the rail industry would allow greater price competition, which in turn could cut the rates for shipping some commodities by as much as 40 percent. Moreover, current pricing policies (alone or in conjunction with other regulations) create prices that can give one freight mode an unfair advantage over another (Anderson and Wilson, 2004). For example, many policies tend to advantage trucking, even though greater use of rail or waterways might help reduce highway congestion. The GAO recently noted that,
additional freight service provided by trucks generated significantly more costs that are not passed on to consumers of the service than the same amount of freight service provided by either rail or water. Freight trucking costs that were not passed on to consumers were at least 6 times greater than rail costs and at least 9 times greater than waterways costs per million ton miles of freight transport. (GAO, 2011, p. i)

In fact GAO (2011) cautioned that, under current pricing and regulatory policies, providing additional capital assistance to highways to better serve freight needs might be a very bad use of scarce resources: “When prices do not reflect all costs . . . the nation could devote more resources than needed to higher cost freight modes, an inefficient outcome that lowers economic well-being” (p. i).

Creating Sustainable Revenue: Is There a Conflict with Efficiency? The second major reason to emphasize the user-pay principle is to create a sustainable source of revenue for the freight system. Many analysts and advocacy groups see charging users directly for their use of the freight network as an effective method to raise the funds needed to expand and maintain the surface transportation infrastructure (and other freight infrastructure investments from pipelines to ports).

Many discussions fail to note an important point, however: Using pricing to meet efficiency goals can conflict with using pricing to create a sufficient and sustainable revenue source. The optimal price needed to change dysfunctional behavior may not be the optimal price for raising revenue. A GAO report (2011) explicitly noted that “[P]olicies that promote efficiency [through pricing] can conflict with other objectives of policymakers, such as covering the costs of government services . . .” (p. 12; emphasis added).

Applying user fees will always raise some revenue; however, imposing fees may not raise revenue sufficient to meet the needs of any given project. And that is because those fees often do induce travelers, and in this case truckers and shippers and producers, to change key aspects of their behavior—such as avoiding tolled facilities entirely (as opposed to using them only in the off-peak, for example). If freight carriers are able to respond to pricing by changing shipping times or modes or routes, a facility designed to be supported with user tolls might not generate
enough income to repay its costs (while adjoining routes may become congested with truck traffic they did not previously have).

An FHWA study of the Southern California region concluded that truck user fees would not cover the costs of a truck-only highway (FHWA, 2011a). Along with other types of infrastructure projects, a number of road toll projects in Australia and Europe have experienced lower than predicted usage and thus insufficient revenue (Skaburskis and Teitz, 2003; Flyvbjerg, 2007, 2008; Siemiatycki, 2010a, 2010b).2

A joint NCHRP-NCFRP (2010) study assessing the revenue potential of tolls on potential truck-only highways concluded that truckers might lack the incentive to pay tolls to lower travel times or increase reliability because the temporal demand for truck-only lanes would be the highest when adjoining free facilities were the least congested. This is because many truck drivers already favor mid-day operation in urban areas to avoid peak periods or already choose routes to avoid peak-period congestion. A recent NCHRP study (2011a) reported that several major research projects concluded that most truckers opposed road tolling, even with off-peak discounts. Other research states that this opposition arises because their delivery times were often inflexible and they could not pass along extra costs (e.g., NCHRP, 2008).

However, some evidence exists that certain kinds of truckers and shippers may respond differently to tolled facilities. An NCHRP study (2011a) did find that long-haul truckers and just-in-time shippers are more favorable to road pricing strategies than are most other kinds of freight carriers if the tolled facilities appreciably reduce congestion. Moreover, a 2008 NCHRP report noted that “truckers can sometimes and do adapt to pricing aimed at shifting travel to the off-peak hours, in spite of the oft-expressed opinion that peak pricing is ineffective for truckers” (p. 90).

This has been illustrated by the response of truckers to “Pier Pass,” peak period fees imposed on container shipments at the marine terminals at the Port of Long Beach and the Port of Los Angeles. The

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2 A related issue is, of course, the serious underestimation of costs of road (and other transportation) projects; Siemiatycki (2009) reviews a number of studies that discuss and debate the causes of this phenomenon. Overall, however, the literature suggests that many projects both overestimate use and underestimate costs, so revenue shortfalls are not caused only by higher-than-expected costs.
Pier Pass had (prior to the recent economic downturn) a measurable impact on peak-period truck flows by inducing many truckers to load or offload during less-congested time periods. At the same time, using pricing to limit truck access to port facilities, for which there is no free alternative, may not be analogous to using pricing to limit access to highway or other facilities for which there are alternatives.

The example of the M6 tolled road, the first British toll road in over a century, may be more telling. Designed with the major goal of diverting truck traffic from the adjoining toll-free M6 through Birmingham, the tolled M6 opened in 2003 with substantially lower truck usage than predicted. Commercial drivers mounted a boycott, angered by the fact that they were charged rates twice those of passenger vehicles to reflect the greater damage their heavy vehicles did to the roadway. And the project has achieved the unenviable position of being criticized by both auto advocacy and environmental groups (“M6 Toll Branded Big Flop,” 2004). The facility is currently underutilized, congestion continues almost unabated on the nearby free motorway, and the private concessionaire has had to restructure the debt because of lower-than-expected revenues.

A 2009 “after” study of the M6 toll road study by the UK government concluded that while the worldwide economic downturn explained some of these outcomes, most effects were seen before then. The UK Department for Transport concluded that by 2009 some long-distance traffic originally diverted to the M6 had rerouted back to the free parallel road (United Kingdom Highways Agency, 2009). (There is currently discussion of opening the toll lanes without tolls when there are major traffic crashes on the untolled M6, because there is excess capacity at all times on the tolled road.)

There is also a potential problem of diversion of traffic from tolled lanes to local streets and roads not designed for that type or volume of traffic (Swan and Belzer, 2010). For example, to avoid toll roads, commercial vehicles in in Melbourne, Australia, are using local roads not designed for truck traffic, creating congestion, safety, and environmental issues. To address this possibility, Germany is using a GPS-based program called “Toll Collect” to charge truck drivers more for using local roads than for driving on the tolled autobahns (Broaddus and Gertz, 2008; Estiot and Springer, 2007).
A number of studies have concluded that we do not have enough information to understand or to model the range of possible behavioral responses to various kinds of fees and charges by either passenger or freight vehicles. A 2005 study of 104 international toll road, tunnel, and bridge projects by the bond rating agency Standard & Poor’s (S&P) found these projects overestimated traffic volumes by an average of 20–30 percent in the first year, with little improvement over the next five years. Most significantly, S&P found that the variability in truck usage was the most significant for revenue estimates, since trucks were predicted to account for a larger share of revenue. NCHRP (2006) reports that a similar 2003 study conducted by another rating agency, FitchRatings, found that many new U.S. toll roads experienced significantly lower traffic volumes, and thus revenue, than forecast (while a few projects did better than expected).

A 2006 NCHRP report on 50 individual U.S. toll projects concluded that we have even poorer knowledge about trucker and shipper response to road tolls and fees than we do about individual traveler response. This study found that the overwhelming majority of the 50 toll projects failed to generate the total traffic volumes predicted and thus failed to meet revenue projections; many experienced as little as half (or less) of predicted use. This occurred not only initially but over time, even as projections were subsequently modified downward over a five-year period. The report attributed the demand overestimation to the inability of current travel models to accurately gauge the response of all travelers, but particularly truckers, to new pricing initiatives in even very simple tolling situations.

A 2011 TRB special study on national data needs noted that, in addition to the lack of basic data on shipper movements, we do not understand industry responses to changes in transportation system performance, travel times, or other performance-related factors. They concluded that these information gaps hinder our ability to make major capacity or facility investments to reduce truck congestion, among other goals.

These studies and experiences do not, of course, prove that the charge on a transportation or freight facility that reduces congestion and the price that raises sufficient revenue are not the same, although
these findings are suggestive. But they do show that we lack sufficient data to know how to accurately set prices to either change trucker or shipper behavior in desirable ways or to raise sufficient revenues for new facilities. To do either, let alone both, we need, at a minimum, better information about how a variety of truckers, shippers, and producers will respond to new tolled facilities, or new congestion fees on existing facilities, particularly when there are free transportation alternatives. If user fees are not likely to produce sufficient income to cover all project costs, then they may be only one part of a revenue-enhancement strategy and we must determine the other sources of sustainable income.

Reform Regulations That Inhibit Modal Competitiveness or Efficiency

Several GAO reports (2008a, 2008b, 2009, 2011) and other studies (Fepke, 2010; Hillestad, van Roo, and Yoho, 2009) have suggested that a national freight policy should address the impact of federal regulations on the freight network. Boyer (1987), among others, has reported on the dysfunctional impact of federal price and other regulations on competitiveness between and among freight modes.

There is conflict, however, over exactly which federal regulations are unnecessary or inappropriately burdensome or which policies should be reformed. For example, a freight industry roundtable, convened by the DOT, released a draft “Framework for a National Freight Policy”3 (FHWA, 2008b) that calls for, among other suggestions, a series of regulatory reforms that do the following:

- Accommodate standard combination trucks on the National Highway System, subject to the same weight limits as on the Interstate portion.4
- Allow longer combination trucks to operate on selected routes.

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3 The report carries a disclaimer that the Framework “does not imply DOT endorsement or industry consensus.”

4 The National Highway System covers more than 160,000 miles of highways built in large part with federal assistance (“federal-aid highways”). Roughly 47,000 of those miles are the Interstate portion of the system.
Accommodate double-stack trains and railcars with higher weight limits.
Accommodate higher-capacity container ships.
Allow greater use of private activity bonds to stimulate private investment in freight and highway infrastructure.
Permit private-sector participants to take advantage of Transportation Infrastructure Finance and Innovation Act (TIFIA) loans.
Relax the constraints on various federal aid programs to reduce the “silo” effect and permit pooled funding for multimodal projects.
Grant State Infrastructure Banks more flexibility in deciding which recipients to whom they can lend money (particularly private-sector participants).

But demands for major regulatory changes may reflect the views of stakeholders burdened by the regulations and not necessarily be unbiased assessments of the legitimacy of those regulations or their value to society. Debates over suggested regulatory reforms often mask deep policy schisms.

To give a financial example, both the Reason Foundation (Poole and Moore, 2010) and the “Framework for a National Freight Policy” (FHWA, 2008b) have called for removing the limits on how many tax-exempt municipal and state bonds can be issued annually to fund private investment in transportation infrastructure (so-called private bonds). But these restrictions were enacted to deal with widespread abuse when it was fairly easy to issue private bonds (prior to 1986); this abuse led to the federal government losing billions of dollars of income tax revenue on investments that may have had dubious public benefits (Porterba, 1989; Zimmerman, 1991; Auerbach and Slemrod, 1997). Since one of the few controls the federal government has over municipal bonds is granting or withholding tax-exempt status, the federal government chose that path to stem revenue losses.

A study by the Congressional Budget Office (CBO, 2004) found that the federal government lost $1.17 for every $1.00 saved by local governments issuing tax-exempt bonds. (Public agencies issuing tax-exempt bonds are able to save money by paying lower interest rates because the income to bond holders is not taxed by the federal gov-
ernment.) In short, allowing municipalities or other public entities to issue bonds on behalf of private-sector investments in transportation represents a significant federal subsidy—it is not a “costless” regulatory reform, although it may be justified.

Another example of a controversial regulatory issue is federal regulation of longer combination trucks—that is, trucks consisting of a tractor and two or more trailers or semitrailers with a gross weight of over 80,000 pounds and an overall length (for one or both cargo units) of over 28.5 feet. In 1991, the federal government attempted to make uniform the maze of state regulations on large truck weights and configurations. At that time, it was not uncommon for such vehicles to be forced to disassemble their components at the border of two states because the two states had very different truck weight and length mandates (TRB, 2002).

However, as the result of political compromises, Congress simply banned longer combination on the interstate highways. At the same time, Congress also allowed a number of states (the “grandfathered” states) to keep their then-current weight and length regulations even on the Interstate portions of their state networks (TRB, 2002). As a result, trucks over the federal limit routinely travel on Interstate highways in some states; Wyoming even allows trailers in excess of 60 feet to operate. It has also been charged that truckers routinely violate the federal limits even in non-grandfathered states because the fines levied for operating over weight are less than the additional profit that can be made with longer vehicles.

There have been attempts since 1991 to make federal control more uniform, on one hand, and on the other to return the control of long vehicle regulation to the states (TRB, 2002). A variety of bills have been introduced in Congress to extend the truck weight and length limits imposed on the Interstates to the entire 160,000 mile National Highway System, allowing only limited grandfathering. The American Trucking Associations have opposed such initiatives, arguing that the 1991 regulations did not recognize changes in vehicle technology, such as longer double- and triple-trailer trucks. Moreover, the American Trucking Associations claim that federal regulations forced heavier
vehicles off the Interstate system and onto roads totally inappropriate for their weight and length (American Trucking Associations, 2009).

The American Trucking Associations and other freight stakeholders continue to seek changes in federal regulations to permit states to allow single-trailer trucks weighing as much as 97,000 pounds, which they argue may “... reduce infrastructure costs, improve safety, lower emissions and cut shipping costs” (American Trucking Associations, 2009, p. 3). The trucking industry claims that allowing fewer, larger combination trucks on most highways in the United States would increase productivity at least 30 percent nationwide.

Other stakeholders are just as opposed to increasing the “span” of heavier and longer trucks. Some believe that increasing truck weights will further divert traffic from railroads, increasing environmental costs. Some studies have found that heavy trucks currently pay as little as 50 percent of the costs they impose on the highway network; if so, allowing heavier trucks can only increase maintenance and rehabilitation costs, especially for bridges.

In 2004, the FHWA was asked by the Western Governors’ Association to test some of these contentions. The FHWA evaluated a truck size and weight scenario in just the western states, where many had been allowed to keep pre-1991 weight and length limits exceeding the federal standard. The Western Governors’ Association’s goal was to evaluate the impact of allowing a number of western states to develop uniform and shared standards (limited only by federal axle load restrictions and federal bridge requirements of a maximum weight of 129,000 pounds).

The FHWA (2004) concluded that in this scenario, under specified assumptions, total truck traffic in the western states would decrease by 25.5 percent, largely among long-haul truckers. But use of extremely heavy trucks would increase substantially; the vehicle miles traveled (VMT) of seven-axle double trailer combinations would increase by 1,065 percent, while the VMT of eight or more axle doubles would increase by 2,541 percent. This would be accompanied by a 76 percent decrease in the VMT of five-axle semi-trailers. Most interestingly, while vehicles of any kind with seven or more axles accounted for only 2.4 percent of then-current truck traffic (in VMT), the FHWA esti-
mated that such vehicles would account for 59 percent of total truck VMT in the alternative scenario (computed from FHWA, 2004, Table ES-2). The FHWA study concluded that pavement costs under the higher weight scenario would drop 4.2 percent but that bridge maintenance costs would increase between 127 percent and 147 percent (Table ES-4). At the same time, some environmental costs, such as energy consumption, noise, and emissions, would drop 10–12 percent, due largely to lower total traffic volumes (Table ES-5). And the study estimated only a miniscule diversion of rail traffic to trucks.

It is important to note that the FHWA report (2004) is replete with warnings about poor data availability and concerns about how tenuous some projections and estimates are. Moreover, the majority of information on the impact of allowing longer and heavier trucks to operate more widely comes from simulations and estimates rather than from actual operating practices. In addition, there is no way to predict what individual states would do if permitted to increase their limits. It is partially for these reasons that there has been substantial discussion of constructing a truck-only toll lane on which much heavier vehicles would be allowed, to test the actual impact of such traffic on key policy variables, such as maintenance costs, vehicle emissions, and noise pollution (FHWA, 2009).

**Respond to Market Failures and Positive and Negative Externalities**

There are major freight problems to which neither the private market nor local public agencies can adequately respond; an example is the need for coordinated activities among many stakeholders in multiple jurisdictions. In addition, local freight projects can create spillover costs or benefits that are not captured in part or full by the market and so are not linked to the appropriate stakeholders. Otherwise worthwhile projects may not be implemented if benefits are too widely distributed or costs are not distributed widely enough. Some analysts and stakeholders have called for government (usually federal) intervention to address these problems.

**Addressing Externalities.** Some analysts call for the federal government to recognize and respond to the costs or benefits created by the workings of the freight system or proposed freight projects, costs
or benefits that are not captured by market transactions. A TRB policy study (2009) noted that “. . . problems in the freight system often create externalities, costs or benefits not captured appropriately or at all by the market” (p. 41). That is, local freight investments can create positive or negative effects in other jurisdictions or for other stakeholders, who have little way to escape those costs and little inclination to pay for those benefits.

Some freight projects create negative externalities, such as air or noise pollution (You et al., 2010; Cheon and Deakin, 2010). A RAND study (Hillestad, van Roo, and Yoho, 2009) remarked,

Accompanied by [the growth in freight volume] has been the negative social effects of large volumes of freight movement, including increased congestion, greenhouse gas and polluting emissions, oil dependency, and safety problems. (p. xii)

In addition to environmental concerns, there are other kinds of negative externalities. A recent RAND study found that transportation projects successful in local areas could draw economic and other resources away from adjacent jurisdictions, creating net losses outside the jurisdiction implementing the project (Shatz et al., 2011).

When the negative externalities that would or do arise from freight projects or problems are serious enough, the federal government may have to force the jurisdictions or firms creating the problems to directly mediate the effects or even to cancel the project. Conversely, the federal government can provide financial assistance to reduce or offset the costs imposed on “nonparticipating” jurisdictions or stakeholders.

At the same time, local spending can create positive externalities: spillover benefits outside the spending jurisdiction for which that jurisdiction may never be compensated. For example, local governments can modernize port facilities or address highway bottlenecks in ways that create benefits for people and businesses hundreds or even thousands of miles away, and this may be particularly true of freight facilities. But if too many of the benefits spill over to other jurisdictions that do not share in the costs, the jurisdiction considering the project may refuse to implement it at all.
Creating Mechanisms to Encourage Cooperation. The private market and individual local and regional public agencies are often unable or unwilling to respond in coordinated ways to a variety of overarching or large-scale problems in the freight network. The free market is not very good at developing approaches to large-scale problems with many stakeholders or those that create benefits for others in addition to the major participants (Cheon and Deakin, 2010). Most stakeholders, public or private, who took the time to put together system-wide or coordinated freight strategies would incur costs that would far exceed their direct benefits (Jose Gomez-Ibanez’s comments in the industry roundtable discussions presented in GAO, 2005). Yet most freight projects address large-scale problems, involve many stakeholders who benefit or lose, and require system-wide or cooperative approaches.

There are direct and indirect calls for federal (and state) assistance in providing mechanisms to encourage and induce diverse stakeholders to develop coordinated freight strategies or coordinated responses to specific freight issues, especially those that extend beyond the boundaries of local jurisdictions and especially states (McDowell, 2009). A RAND study (Hillestad, van Roo, and Yoho, 2009) noted the need for coordinated freight *system* planning to address the fact that current solutions tended to be local and stakeholder-specific, failing to consider broader and national consequences and costs.

The federal government could provide the framework and incentives for stakeholders to work together—for example, by assisting state departments of transportation or regional transportation planning agencies to bring a variety of stakeholders to the table in a productive way. The federal government has helped fund, for example, several multistate freight corridor efforts, such as the I-95 Corridor Coalition (which includes all the state departments of transportation from New Hampshire and Vermont in the north to Florida and Georgia in the south, as well as other relevant public agencies along the alignment of U.S. interstate I-95).
CHAPTER FOUR

Four Major Elements of a Suggested Federal Freight Transportation Policy

Overview

Over the past decade, many analysts and stakeholders have called for a new or expanded national freight policy that meets some or all of six important, and often crosscutting, goals or objectives: improving freight planning efforts, providing federal assistance to appropriate freight projects using sustainable revenue sources, conditioning federal assistance on measurable performance criteria, requiring projects to have a substantial user-pay component, reforming inappropriate regulations, and responding to market failures such as externalities. This monograph suggests four policy elements of a national freight policy that respond to these commonly agreed-on policy goals:

- Develop a federal capital freight assistance program using sustainable revenue sources that bases funding decisions explicitly on specific performance measures.
- Reform regulations that directly or indirectly inhibit or distort competition among freight modes or place financial restrictions on the participation of private stakeholders.
- Encourage and increase user-based pricing to improve the economic efficiency of the freight network and create a sustainable revenue source for federal freight programs, recognizing that these two goals are not always compatible.
- Enhance the ability of state, regional, and local planners to address pressing freight issues by improving the quality of freight data,
knowledge of best practices, and the capacity of local institutions to effectively plan complicated and complex freight projects.

These four crucial elements collectively address the six major objectives for a federal freight policy agreed on by most analysts and stakeholders, as discussed in the previous section. As Table 4.1 indicates, all of the objectives are met by the four elements combined, although each individual element does not meet all goals. These four elements are not hierarchical, nor are they necessarily sequential; at the same time, a successful federal freight policy would require the existence of all these activities because they are mutually supportive. The individual sections below describe each of the four major elements of

### Table 4.1
Matching Goals and Objectives to Strategic Elements

<table>
<thead>
<tr>
<th>Goal/Objective of U.S. Freight Policy</th>
<th>Develop Capital Assistance Programs</th>
<th>Investigate and Reform Regulations</th>
<th>Encourage and Increase User-Based Pricing</th>
<th>Improve Data and Enhance Institutional Capacity</th>
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<tr>
<td>Improve freight planning efforts</td>
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<td>Provide federal financial assistance with sustainable revenue sources</td>
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<tr>
<td>Condition federal assistance on explicit performance measures</td>
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<tr>
<td>Require substantial user-pay component in aided freight projects</td>
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<td>Reform regulations inhibiting competition</td>
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<td>Respond to market failures (e.g., externalities and need for cooperative efforts)</td>
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the freight policy framework. Chapter Five discusses revenue sources in greater detail.

**Element 1: Develop a New Federal Freight Capital Investment Program**

This element suggests how to structure a new or modified program of discretionary federal grants and loan subsidies for freight or intermodal projects. The core of this element addresses three of the six common goals for a federal freight policy. Most obviously, this element addresses the goals of providing federal financial assistance based on sustainable revenue sources and requiring a substantial user-pay component for aided freight projects. Less obviously, but in ways that will be explained below, this element addresses the need to condition federal assistance on explicit performance requirements and to respond to market failures like externalities.

This element applies traditional BCAs in nontraditional ways to (1) evaluate a proposed project against explicit criteria and (2) indicate who would benefit or incur costs from the implementation of the proposed project in order to achieve their proportional funding of aided projects (or to offset their losses). Freight projects to be considered for federal funding can be evaluated in four steps or stages, which may overlap slightly but still proceed in a linear fashion:

1. Conduct a traditional BCA, which provides one overall benefit-cost ratio for a project (which may have internal weights to meet specified federal goals).
2. Disaggregate that BCA so that the distribution of costs and benefits among major stakeholders, public and private, is made explicit and spillover effects are carefully identified, to allow for the assignment of costs.
3. Determine what portion of benefits are national in scope and in the national interest and thus whose costs should be eligible for federal financial support.
4. Match the federal response to the problem proportionately to the degree of federal or national benefit.

Under this approach, federal assistance would not cover the majority of project costs because so many project benefits would accrue to specific and identifiable local areas and individual stakeholders, both public and private, who would be expected to pay their fair share.

The approach does not in itself determine whether federal assistance of some kind should be awarded to a particular project or the nature or source of any financial aid. It does allow the federal government to identify highly promising freight or multimodal projects with substantial national benefits, and it provides a structured way to rank those proposals against certain criteria and to match them to the appropriate kind of federal financial or other assistance. It is likely that there will be more economically efficient proposals than funds available; other perfectly appropriate considerations will come into play, such as equity, geographic distribution, total net project benefits, and total national benefits.

**Step 1: Conduct a Benefit-Cost Analysis**

BCAs are one way to evaluate whether the benefits of a project outweigh the costs, that is, whether a project is economically efficient. As a European Union report noted,

> Every time an investment decision has to be taken, one form or another of weighing costs against benefits is involved and some calculation over time is needed to compare the former with the latter when they accrue in different years. (European Commission, Directorate General of Regional Policy, 2008, p. 18)

As previously discussed, BCAs have strengths and weaknesses. But many economists have made changes in the approach to deal with a variety of problems (Sunstein, 2004; OECD, 2008; van Wee, 2008). For example, BCAs have been used to show net benefits for a number of different policy objectives or to account for distributional effects. Once it is accepted that BCAs can differentiate between costs incurred in support of different policy goals or those incurred by different stake-
holders and those in different jurisdictions, it becomes possible to use the approach to distribute the costs of freight projects among a variety of stakeholders and ultimately to determine (in a later step) the costs that the federal government would be justified in supporting.

In fact, the Federal Transit Administration (FTA), which requires a simplified BCA for applicants to the New Starts program, which provides competitive grants for new transit capital investments, has established and ranked specific goals it expects from funded projects. The FTA requires proposers to submit analyses showing project impact on each of those goals.

A significant issue for freight projects is how to handle indirect (second- or third-order) benefits. In a traditional BCA, only benefits arising directly from the infrastructure investment are counted. If a transportation improvement allows trucks to save time, the only benefits included in the analysis are monetized time savings. But those time savings may be capitalized into the price of nearby land, which is now more attractive because it is more accessible. Third-party warehousers might decide to locate along improved freight corridors, thus changing the shipping practices of a host of local industries and firms who become more productive.

But the increase in land value or the savings to firms that change their shipping practices are not included as a benefit in traditional BCAs, both for technical reasons (they may actually be double counting the same benefits) and because they are difficult to accurately predict (and postulating hypothetical outcomes with unknown probabilities can be used to manipulate the findings [GAO, 2005]).

However, an NCFRP-NCHRP (2010) joint study of the impact of truck-only lanes found that an increase in time savings and reliability would be only one of two major benefits of such facilities; the other would be productivity improvements arising from the ability of trucks to carry heavy payloads. Other analysts have argued that indirect or second-order benefits, such as changes in the nature of the supply chain in response to such infrastructure or policy changes, should be included when evaluating freight projects (Keegan, Favero, and Porter, 2007). In Europe, Australia, and New Zealand, these economic impacts are called “WEB”—wider economic benefits (OECD, 2008). To obtain
national capital grants in these areas, local and state governments must conduct traditional BCAs and then separately assess the second-order or indirect WEBs of proposed infrastructure projects.

The DOT or Congress would have to decide whether and how such information should be used. The FHWA’s freight benefit-cost guidelines (HDR/HLB Decision Economics, Inc., 2008) now suggest the inclusion of second-order benefits, such as product differentiation and long-term changes in industrial production and distribution patterns that lead to cost savings. The FTA’s guidelines for the economic analysis of New Starts projects also allows but does not require proposers to submit evidence of the indirect benefits of their projects—including the benefits of commercial and residential “agglomeration,” such as the development of transit-oriented communities where people can walk or use public transit to meet their needs.

BCAs are difficult and expensive to undertake; the idea may be more appealing than the execution. Doing a genuine BCA is a difficult task for which most applicants will need guidance, even if they hire consulting companies to do the detailed work. Infrastructure Australia, a recently established national agency designed to fund capital projects of national significance, found it necessary to develop detailed guidelines for applicants that run to 100 pages. The European Union, which requires BCAs for all infrastructure proposals, has a “simplified” set of guidelines—the document has almost 300 pages. The Army Corps of Engineers, credited with developing the original approaches to BCA as the result of early U.S. government mandates (Fuguitt and Wilcox, 1999), has developed a software program, ECONPACK, to assist in conducting BCAs of water projects (U.S. Army Corps of Engineers, no date). The U.S. Army Corps of Engineers offers a lengthy training course to enable analysts to use that model. The Office of Management and Budget (1992) has developed substantial guidelines for conducting BCAs (OMB Circular A-94), as have the U.S. Centers for Disease Control and Prevention (no date).

To make this step workable, the DOT would have to build on current FHWA work on BCA assessment of transportation projects in general and freight projects specifically, relevant work by the FTA, and
the work mentioned above by other federal agencies, to lay out guidelines and standards. The DOT would have to, at a minimum,

- Ensure uniformity in conducting proper BCAs.
- Establish a series of internal rates (e.g., discount and inflation rates) as well as a specific time frame for different types of infrastructure projects.
- Identify and rank key objectives, providing weights for those objectives.
- Determine the outcomes (performance measures) that must be assessed.
- Decide how second-order impacts will be measured and evaluated.
- Provide detailed guidance and training to ensure that all applicants understand the process and what is required of them.

For traditional BCAs, the ultimate products of Step 1 would be (1) a single benefit-cost ratio that aggregates all costs and benefits over all goals and performance measures and (2) a dollar figure representing the total net benefits. While a single ratio is the most common outcome of a BCA, that number tells us nothing about the total benefits or costs of a project. One project may have a ratio of 3.0 but produce only $10,000 of net benefits; another project may have a ratio of 1.5 but produce $100,000,000 of benefits.

In this approach, the decision to proceed further would initially depend only on the benefit-cost ratio and not total net benefits in dollar terms. This is because the federal government may decide to establish multiple assistance programs supporting projects of different sizes and impacts. Rather than fund a few very large projects, it may be in the public interest to fund many smaller projects whose total net benefits exceed those of a few mega-projects. Or Congress may determine to do the reverse: fund large projects and not smaller ones. The European Union has classes of project grants to explicitly allow projects of like magnitude to be compared with one another. (The European Union also requires less sophisticated analyses for smaller grants.)

If a BCA ratio is over 1.0, a proposed project can be said to be economically efficient. But many agencies and other governments demand
a higher ratio, such as 1.5 or 1.75. This, of course, is a policy decision, but it seems wise to set the lower limit at 1.5—projects will not be further considered if they do not achieve a ratio that indicates that their benefits exceed their costs by at least 50 percent. Poole and Moore (2010) of the Reason Foundation, in a somewhat different context, have suggested the same criterion.

Requiring a BCA ratio of at least 1.5 can serve three major purposes. A higher cut-off may result in projects having to demonstrate genuine benefits (rather than largely theoretical ones) as well as reducing the total number of proposals submitted for consideration. Just as important, ensuring that a project has significant net benefits also makes it easier to divide costs among beneficiaries. Stakeholders are more likely to participate in projects from which they receive benefits well in excess of their costs. (Although a BCA of 1.5 does not mean that all beneficiaries receive benefits 50 percent higher than their costs.)

Traditional BCAs rank all goals and values equally—in dollar terms. But it is possible to weigh differently the dollar costs and benefits of specific objectives and goals. It would be ideal if Congress would clearly define which federal objectives take precedence over others or lay out what performance or other criteria qualify a specific freight or multimodal project for federal funds—but that has not been the case. Congress has, however, stated in several successive surface transportation laws that it values equity, efficiency, safety, economic competitiveness, national security, and environmental protection (among other objectives) from federal transportation programs. If Congress or the DOT chose to do so, they could also require applicants to rank proposed projects separately against each stated policy objective—and could choose to give more weight to one objective over another. Any given project might meet one federal objective, for example, safety, far more than it met another objective, for example, environmental protection. If Congress wished to do so, project outcomes could be ranked and scores weighted to reflect those priorities.

The final product of Step 1 is the calculation of a ratio representing total benefits received by all stakeholders divided by the total costs they incur (perhaps weighted internally in some way as just suggested). If a proposed project has a benefit-cost ratio over 1.5, it will be further
analyzed; the results of the first step in the freight strategy will serve as the input to the next step in the process.

**Step 2: Disaggregate Costs and Benefits Among Major Stakeholders**

Step 2 backtracks in some sense to look at the substantial amount of disaggregated data that were required or collected in Step 1. The goal is to analyze the data collected in Step 1 and to link individual costs and benefits to specific stakeholders, such as a railroad, or large groups of stakeholders, such as international shippers, and/or to specific geographic areas. The ultimate product of Step 2 is a comprehensive list of stakeholders who benefit and those who incur costs from a proposed freight project—as well as a list of the measurable benefits that are hard to link to specific stakeholders or geographic areas.

In fact, in many BCAs, standing, or whose benefits and costs will be included in the analysis, is decided by geography—those beneficiaries within the jurisdiction(s) paying for the project are considered to have standing and those outside that jurisdiction are not (Fuguitt and Wilcox, 1999). The same is even more true of the incidence of costs; many project analyses include only the costs borne by those living within specific jurisdictions. Many federal and state environmental regulations were enacted precisely because analysts and decisionmakers often ignored project costs that were experienced outside the project area, particularly environmental costs and other negative externalities (Sunstein, 2004; OECD, 2008).

There are technical challenges with this approach that must be addressed. Although cumulative costs and benefits are the sum of individual stakeholder costs and benefits, those data may not be available at the stakeholder or appropriate geographic level. Some data, for example, may be available only at the regional level or for groups of stakeholders (e.g., freight carriers or international shippers). Data for individual private-sector stakeholders are particularly difficult to obtain. However, approximations can be made and tested; FHWA is developing a number of freight databases using publicly collected data in lieu of incomplete private-sector information.

While Step 2 may pose technical difficulties, there are examples of BCAs that have used a variety of the approach suggested here. The
Danish government undertook three separate analyses of a new rail and highway bridge from northern Germany to a Danish island south of Copenhagen. One BCA was done for Denmark alone, one for Germany alone, and one for all of Europe; the explicit goal was to show different stakeholders the net benefits that they would receive from the bridge, rather than total project benefits, in order to gain their cooperation. The ratios in all three cases were well over one, which led to the bridge’s inclusion in the European Union’s top 30 infrastructure projects for EU cost-sharing in the range of 5–10 percent of the total costs. At the same time, environmental stakeholders contended that the bridge would have profound negative impacts on wildlife habitats and soil erosion that were not included in the cost-benefit calculations (Vieregg-Rössler, 2008; “German Fehmarn Uncertainty,” 2011).

In a different arena, a RAND study (Karoly, 2009) of the impact of California’s early childhood education program used relatively traditional BCA methods. However, the study recognized that some children who had participated in these programs would later move from the state, so the analysts subtracted the benefits those children would obtain (higher paying employment, etc.) from the cumulative benefits that California would receive from the education program. Again, this approach recognized that individual stakeholders, here the state of California, were more concerned about the net benefits they would receive than they were about total project benefits.

A joint research report from NCFRP and NCHRP (2010) contains detailed guidance on conducting a BCA of commercial motor vehicle (CMV)-only lanes. While not explicitly endorsing the approach described here, the report shows, in great detail, how analysts can separate and disaggregate appropriate benefits by stakeholder and along the public/private-sector divide. In addition, the FHWA has a highly developed freight benefit-cost model, which may be able (now or in the future) to address these issues.

The ultimate goal of Step 2 is to provide a list of stakeholders who benefit and those who incur costs from a proposed freight project. But the analysis will also produce a list of real and measurable benefits that cannot be shown to accrue to specific persons or industries or even specific geographic areas. This distinction is important to the freight
strategy described here because these are the benefits that are most likely to qualify for federal financial assistance, especially when they cross jurisdictional boundaries.

Disaggregating the costs and benefits of a traditional BCA to identify the specific stakeholders or groups of stakeholders or geographic areas that receive benefits is valuable because the process

- identifies beneficiaries who did not know or understand the potential of a proposed project for themselves
- helps start conversations between and among stakeholders that can lead to negotiated partnerships
- facilitates the development of strategies to compensate losers
- allows policymakers to attribute costs and benefits to specific stakeholders, public or private and by level of government, as the input to the process of dividing costs in Step 3 according to a user-pay standard.

For example, the GAO (2008a) noted the success of the Illinois CREATE project in using a BCA to involve private railroads in a large-scale, multimodal freight project. But the single unified cost-benefit ratio was probably less important to private-sector contributors than were the disaggregated BCAs that convinced them of the individual benefits they would receive by participating in the project.

In addition, disaggregating project costs and benefits can be used as a tool to involve many different stakeholders in the decision process. Economist David Lewis (GAO, 2005) has found the approach to be an important way to get participants and stakeholders to understand the spectrum of costs and benefits arising from a proposed project and to help stakeholders determine which trade-offs they want to make. The process itself can be used to draw potential beneficiaries into cooperative conversations about the potential benefits of participation, overcoming the “free rider” problem or at least initiating important discussions about potential cost-sharing. In addition, the process can identify winners and losers, something a traditional BCA does not do well; this, in turn, provides a way to compensate those who lose a great deal on an otherwise justifiable project.
The four basic outputs of this step in the first element are identifying:

- stakeholders who clearly receive a measurable share of project benefits and should be expected to pay a defined share of project costs
- benefits that accrue to multiple and diverse stakeholders and/or those outside the jurisdiction implementing a project from whom it would be difficult or expensive to get payments equal to their share of project costs
- benefits that accrue to stakeholders from whom it would be not be possible or in violation of other policies (e.g., distributional equity issues) to obtain payments equal to their share of project costs
- costs that that would accrue to a variety of stakeholders from the implementation of the project and for which payments or efforts to make them “whole” should be evaluated.

A report prepared for the National Surface Transportation Policy and Revenue Commission (Cambridge Systematics, 2008) noted,

there has been increasing discussion . . . about government’s role in helping finance certain freight-oriented improvements, including investments in private infrastructure where there is a public benefit, and conversely, private sector investments in public infrastructure where a private benefit is identified. (p. x)

This strategy suggests a way to directly address these concerns. This step can help illuminate who wins and who loses from a proposed project and particularly which benefits accrue to specific identifiable stakeholders. This process also makes clear those benefits that are more widely distributed or spill over to other stakeholders or jurisdictions in ways that make it unlikely that those beneficiaries will volunteer or can be made to help pay for the project. Conversely, the approach will identify those that may suffer costs from a project that would not or cannot be addressed by the jurisdiction implementing the project. Once the incidence of project impacts and the spillovers of costs and benefits are identified, a discussion of the federal role in addressing the dispersed costs and benefits becomes more meaningful.
The output of Step 2 will serve as the input to Step 3. Since Step 1 and Step 2 overlap or parallel one another to some extent, they can be conducted in tandem, if proposers are willing to assume that their ultimate benefit-cost ratio will be over 1.5.

**Step 3: Determine Nationally Significant Projects**

The most important output of Step 2 is the determination of (1) the individual beneficiaries of those freight or inter-modal projects whose BCA ratio is over 1.5 overall or in terms of specified national goals and (2) those who will experience costs (or costs in excess of benefits) from such proposed projects. Step 3 is designed to determine, based on that information, which economically efficient projects merit federal financial assistance.

Consistent with the underlying rationale of Step 2, and in the absence of clear congressional intent or federal policy, this step suggests that federal financial assistance may be warranted when (1) economically efficient projects first have significant cost-sharing from local beneficiaries, public and private, in proportion to their share of the benefits and (2) a sizable component of those funds are generated from specific user-fees and charges. In such cases, federal assistance would be warranted to cover some or all of any gap between total project costs and those beneficiary contributions when proposed projects

- distribute a substantial share of total net benefits outside the jurisdiction(s) undertaking the project, that is create substantial spillovers
- provide benefits to dispersed stakeholders or groups of stakeholders from whom it is not efficient to recover a share of costs proportional to the benefits they receive from the project
- provide significant benefits to stakeholders, users, and others from whom it is not considered appropriate to collect a share of costs (for example, because that would violate environmental justice or distributional equity goals)
- create significant costs to stakeholders, users, and others (or costs in excess of benefits), costs that would prevent implementation of
the project or which, by policy, we believe should be redressed or compensated.

In most cases, federal assistance would include grants or loan subsidies to meet any gaps between user-based beneficiary payments and total project costs (including payments to net project “losers” if any). However, the federal government could also provide structures and incentives to facilitate cooperative payment agreements among beneficiaries outside the jurisdiction implementing the project.

Determining which projects meet these criteria would be based largely on the disaggregated analyses undertaken in Step 2. The basic premise of Step 3 (and this entire element) is that the federal government could choose to pay for (1) those benefits that are experienced outside the jurisdiction(s) implementing the project if there is no clear way to achieve payment from those beneficiaries and (2) costs experienced by those both within and outside the jurisdiction(s) implementing the project if this is consistent with environmental or distributional or other goals. The federal government could also choose to pay a larger share of project costs in the wake of a national disaster or for national security reasons.

While nationally significant projects can range widely in size, it makes sense to give priority to larger, complex, or interjurisdictional projects that would otherwise face serious challenges to being implemented. However, as previously suggested, a program of grants for projects of different sizes may be in the national interest as well.

In important ways, this approach diverges from those suggested by other analysts and stakeholders. First, the 2009 TRB freight financing study recommended that the federal government should provide financial assistance only when other governments cannot fund a project unless there are significant environmental externalities. But this creates a major problem: Limiting federal assistance to those projects that would not otherwise be funded may not be economically efficient.

As briefly mentioned in Chapter Three, a recent RAND study (Shatz et al., 2011) found that many highway projects were on balance positive in that they created economic benefits in excess of their costs but that significant project benefits often spilled over into adjacent
counties or even other states. In fact, some studies reviewed by RAND concluded that the economic impacts of transportation improvements can be positive overall but negative at the municipal level because of these spillovers. Local, county, and even state governments are unlikely to fund projects that produce net losses within their boundaries even if they also generate large net benefits to other jurisdictions. As a result, the nation would lose potential benefits and/or continue to incur major costs without federal intervention.

The approach suggested here also diverges from those that suggest that freight transportation is somehow inherently the responsibility of the federal government because of its special nature or because freight moves along interstate highway corridors. The approach described here argues that if clear benefits accrue to specific and identifiable stakeholders, public or private, those beneficiaries should pay in proportion to their share of those benefits. If projects genuinely have a benefit-cost ratio of 1.5 or more, many participants will receive benefits well in excess of any costs they must cover—even if they would not volunteer to cover those costs in the absence of specific mandates that accompany federal intervention or assistance.

Step 4: Match the Federal Response to the Problem
To be cost-effective, federal assistance should be specifically matched to the needs of highly rated freight projects. Possible national responses depend on the nature of the problem being addressed by a freight or intermodal project. The federal response could involve any or all of the following:

- providing financial support to bring stakeholders together and conduct preliminary planning efforts
- offering loan guarantees and loan subsidies for those projects that could be entirely self-sufficient over time but need startup costs
- giving outright capital grants limited to the federal share of proposed projects (as determined by Step 2 and 3 analyses).

Some research and advocacy studies claim that many freight projects could eventually cover their own costs but cannot obtain capi-
tal because they are seen as risky or uncertain; this may be particularly true of large-scale, multimodal freight projects. The appropriate response might be for the federal government to provide loans, loan guarantees, or loan subsidies by expanding the TIFIA or related loan programs. However, the TIFIA has not been used as frequently as supporters suggested it would be because many projects, as structured, simply will not generate enough user revenue to be able to pay back loans (although loans can be repaid from taxes as well as direct user fees) (GAO, 2008b).

There have been a number of calls for a national infrastructure bank that could make loans for a variety of infrastructure improvements at the state and local levels (CBO, 2008). A recent joint report of the U.S. Treasury and the Council of Economic Advisors (2010) argued that a major role for an infrastructure bank would be to develop the institutional capacity to conduct sophisticated benefit-cost and related analyses of proposed freight projects.

Current discussions suggest that some advocates see such a “bank” as a source of both grants and loans (or loans that would not need to be fully repaid if certain conditions were to be met). To the extent that is true, grants made by an infrastructure bank would probably meet the same stricter criteria as do any capital grants.

The CBO (2008, pp. 20–21; Orszag, p. 21) suggests that in lieu of the current kind of loan subsidies, which are very expensive for the federal government, tax-credit bonds would achieve the same outcomes for local borrowers while reducing the drain on the treasury. The advantage of this method is that the revenue forgone through the tax credit is transferred to borrowers rather than to higher-income taxpayers. The American Recovery and Reinvestment Act of 2009 also created a new type of tax-preferred debt, the direct-pay tax credit bond, which might also be useful in funding freight improvements.

Element 2: Investigate and Reform Regulations

There is substantial discussion of the need for new or different national freight regulations, particularly those that (1) affect prices and thus
competition between the freight modes (Anderson and Wilson, 2004) and (2) inhibit the involvement of the private sector in freight projects. The federal government has both a direct and an indirect role in these areas. This element calls for the federal government to evaluate the potential of various regulatory changes, gathering, evaluating, and synthesizing all available research and actual operational experiences on a variety of reforms. Also, where information is scarce and the risk high, the federal government could implement a variety of pilot or demonstration projects whose results could lead to regulatory changes or reform at the federal (and other) levels.

In so doing, this element would directly or indirectly address three of the six widely advocated goals and objectives for U.S. freight policy—most directly, of course, the goal of reforming regulations that inhibit competition between freight modes and/or limit the role of the private sector in financing freight projects. In addition, having better information on the effectiveness and impacts of current regulations and proposed regulatory reforms would help improve freight planning efforts at all levels of government. For example, an NCFRP report (2010c) noted that local governments often impose regulations on freight traffic in response to community concerns, without understanding that these actions increase shipping costs and sometimes force shippers and truckers to move out of metropolitan areas. Knowledge of the impact of many kinds of local planning regulations that impact freight carriers might lead to better outcomes. This element also will help the federal government better condition grants and loan subsidies on explicit performance measures.

Industry stakeholders have generated a long list of regulatory reforms that they feel will reduce challenges faced by the nation’s supply chain network by evening the playing field between the freight modes and thus allowing for more efficient use of the nation’s freight networks, particularly the highway system. (The regulatory changes sought by the freight roundtable [FHWA, 2008b] were listed in Chapter Three). A recent GAO report (2011) noted that both the federal government and the states should recognize that their policies directly or indirectly provided subsidies to specific freight modes at the expense of other freight modes, creating substantial efficiency losses.
Many of the suggested regulatory revisions have not been fully evaluated. Some may represent the views of the regulated industry and are not necessarily the best way for the federal government to proceed. Some could impose increased costs on some stakeholders that exceed benefits to others. But, clearly, it is the federal government’s role to fully evaluate the short- and long-term implications of both existing regulations and proposed regulatory changes.

A model that DOT might emulate is the Navigation Economic Technologies Program of the U.S. Army Corps of Engineers, the goals of which are to expand the body of knowledge about the economic forces affecting waterways and harbors and create a “toolbox” of practical planning models, methods, and techniques to be applied in a variety of regulatory settings (U.S. Army Corps of Engineers Navigation Economic Technologies Program, 2009). The ongoing program creates work teams of Corps personnel and outside academic experts as well as those from other agencies and stakeholder groups. Each work team addresses a significant research problem; the work and results are rigorously peer-reviewed by independent academic experts.

If appropriate, the federal government may wish to fund demonstration projects to test the most controversial regulatory revisions. The most widely discussed regulatory elements advanced for additional study and focus are as follows:

- Allowing private-sector participants to obtain funding from the TIFIA and comparable railroad programs (perhaps limited as to amount).
- Identifying the specific regulatory barriers to greater use of current federal grant programs for private or public-private freight projects and developing ways to relax or remove them.
- Permitting combination or heavier trucks on limited routes to determine the impact and public response (TRB, 2002).

It is difficult to see that any other entity than the national government could make these changes and fairly evaluate their outcomes.
Element 3: Encourage and Increase User-Based Pricing

A number of studies have concluded that congestion and many related issues in the freight network could be addressed without expanding the capacity of the freight system if shippers and producers were induced to change their behavior through the imposition of user fees that reflected the negative impact of driving or delivery in congested areas or time periods (CBO, 2008; Orszag, 2008). This element calls for two types of federal action. The first is a two-part activity: (1) Adopt increasingly more direct user-pricing mechanisms (such as VMT charges) to provide the revenue for federal expenditures and (2) make the adoption of direct user-pricing of freight facilities and services a requirement associated with federal financial assistance to local freight projects.

The second federal action is to investigate how various segments of the supply chain network are likely to respond to pricing initiatives under differing industry, cargo, and transportation conditions. This activity is designed to address a number of important questions: Do those paying tolls avoid tolled facilities, modify hours of travel or delivery, change freight modes, or engage in other activities in response to new or additional user-fees or charges? For example, do they change what they produce or the products they ship to certain regions or do they move warehouses out of central areas? How do responses vary by industry and commodity and mode, as well as by shipping alternatives available? The NCFRP is currently funding a study of industry trade-offs in paying or avoiding tolls.

This element meets three of the six most commonly advanced objectives for U.S. freight policy; most clearly it assists all levels of government in increasing the role of user-based pricing. The knowledge generated by this element can highlight promising sources of sustainable financial support for freight projects at all levels of government while addressing the need for certain types of regulatory reforms in the freight network. The element also helps the federal government condition financial assistance on explicit performance criteria.

This element most directly responds to the fact that local, regional, and state agencies need detailed information on how to fashion pricing strategies that meet their goals, whether to provide a sustainable rev-
enue source or to improve the efficiency of existing facilities, or some combination of these goals. As an NCHRP (2010b) study on general road pricing noted,

[S]uccessful road pricing plans and programs require sound planning practices. Planners need to analyze and present road pricing concepts that are most suitable and effective given local goals and high-priority problems that road pricing can address such as congestion, pollution, sustainability, and finance of transportation infrastructure. Plans must be financially feasible, address equity issues, be operationally feasible and be sensitive to privacy concerns. (p. 3)

The federal government has an important role in gathering and assessing wide-ranging data about pricing projects involving freight, as well determining how key aspects of the local business environment or transportation network determine commercial vehicle behavior. Accurate assessments of driver response, shipper and retail behavior, and interaction between the freight modes are vital to predicting both system revenue and impacts on congestion, pollution, and other measures of system efficiency. Good data on actual variations in freight response to tolls and various pricing schemes would make modeling outcomes in other areas more accurate and realistic.

There is also an important federal role in expanding current pricing efforts to fund pilot or demonstration freight pricing projects, such as greater national use of VMT charges on trucks that vary, at a minimum, by distance and weight per axle as well as time of day and, when technically feasible, by the type of roadway or facility being used.

The federal government could also fund a demonstration project to test truck-only or CMV lanes. A recent NCHRP-NCFRP (2010) report concluded that while the idea had been long discussed and was featured as part of some suggested freight financing strategies, there was actually very little experience with the approach and little information about the problems and impact.
Element 4: Improve Freight Data, Information, and Agency Capacity

Many agencies and stakeholders at various levels of government face serious challenges in addressing problems in the U.S. freight network: the lack of timely and comprehensive freight data, little reliable information on promising techniques or strategies to resolve local freight issues, and limited agency skills and experience in addressing freight issues including marginal ability to conduct economic analyses or link projects to specific performance standards (GAO, 2008a, 2008b; Orszag, 2008; Hillestad, van Roo, and Yoho, 2009; NCFRP, 2010a, 2010b). This element addresses these specific barriers to improving freight planning efforts as well assisting the federal government to condition its financial assistance on explicit performance measures. The element can also help all levels of government to identify externalities and help fashion cooperative responses to complex freight problems.

The federal government already has a role in many activities designed to address these problems. Congress created the NCFRP to address crosscutting research needs in the supply chain network (supported by pooled state planning and research funds).1 FHWA also has developed a number of freight planning and management tools (HDR/HLB Decision Economics, Inc., 2008).

These are important steps, but clearly much more must be done; an expanded federal role seems both appropriate and required. A 2011 report from the TRB recommended that the federal government develop a National Travel Data Program to overcome current shortcomings in both freight and passenger data. The report suggested that, with the strategic advice of a Program Advisory Council, the DOT,

in collaboration with its partners, [should] move quickly to develop a multiyear plan defining action steps, roles and responsibilities, and milestones to manage and track the development and implementation of the [data] program, and report biennially to Congress on the progress of the effort. (p. 4)

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1 Prior to the formation of the NCFRP, freight research was undertaken by the NCHRP, which still supports some research in the freight area.
But in addition to better, more consistent, and more comprehensive freight data, there is also the need to turn insights gained from research already underway or completed into useful tools for transportation planners and engineers working at the local, MPO, and state levels. It is clearly more efficient for the federal government to help develop a national freight data architecture; structure training courses and materials to enhance the capacity of a variety of local, regional, and state agencies that do or should address freight issues; conduct research and disseminate information on promising freight techniques developed around the country (and the rest of the world); and finance (at least in part) pilot and demonstration projects.

To improve current state, local, and MPO planning processes and local asset management and traffic operations so that they competently address freight issues, the federal government could fund activities that

- Improve or expand existing programs designed to develop better and more reliable freight data.
- Conduct additional research on pressing problems in planning and operating the freight network.
- Evaluate the transferable elements of ongoing or well-known projects and smaller local efforts, to determine transferable elements and identify best practices.
- Disseminate practice-based findings.
- Develop new or additional training materials based on current research and best practices.
- Modify state and MPO transportation planning requirements to encourage or require greater consideration of multimodal and multijurisdictional freight projects.
- Conduct outreach to private stakeholders to encourage them to participate in those processes.
- Develop more effective ways to help state and MPO planners use appropriate economic methods to identify and assess the costs and benefits of individual freight projects.

These activities could also be focused on evaluating the pilot or demonstration regulatory and pricing projects suggested in other freight policy elements.
Table 5.1 summarizes potential direct and indirect user-related revenue sources that could fund the suggested federally supported activities in all four elements of the freight strategy. Table 5.1 focuses only on how the federal government could obtain funds to support those activities (although it may have relevance for other levels of government). It would be the responsibility of state and local recipients to fund their shares of specific projects, relying on a variety of direct user fees, if appropriate, as well as contributions from private beneficiaries.

The advantage of the four-step BCA of Element 1 is that it indicates the appropriate federal assistance role and the amount of federal financial assistance that will be economically beneficial. It also indicates to local governments and private stakeholders how they might apportion local costs—although they have no obligation to apportion costs in that fashion, as long as their share is based substantially on direct user charges.

A major rationale for the strategy of disaggregating user benefits computed within a traditional BCA is to more clearly link users with benefits in order to establish payment strategies. But how directly users can be charged for the benefits of specific federal freight initiatives and projects within each of the four policy elements varies markedly. In particular, not all of the various activities in each element lend themselves to direct pricing. For most of the elements, other than the first, recipients and beneficiaries may be too diffuse to directly charge for services provided. In other cases, the largest share of costs, such as collecting and assessing national freight data, must be incurred up front.
Table 5.1
Federal Charges to Users/Beneficiaries to Cover Federal Costs

<table>
<thead>
<tr>
<th>Element 1: Develop Capital Assistance Programs</th>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway bottlenecks</td>
<td>None, except in unusual cases</td>
<td>Highway user taxes; VMT charges</td>
</tr>
<tr>
<td>Highway corridors</td>
<td>Tolls, varied by distance, time of day, weight per axle</td>
<td>Highway user taxes; VMT charges</td>
</tr>
<tr>
<td>Inter-modal facilities</td>
<td>Container charges</td>
<td>Freight waybill taxes</td>
</tr>
<tr>
<td>Railway improvements</td>
<td>Container charges</td>
<td>Dedicated transportation use surcharge on customs duty</td>
</tr>
<tr>
<td>Port facilities and improvements</td>
<td>Container charges</td>
<td>Freight waybill taxes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Element 2: Investigate and Reform Regulations</th>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate regulatory changes/reform</td>
<td>None, except in unusual cases</td>
<td>User taxes: fuel excise taxes, excise taxes on trucks and tire sales; HVUC</td>
</tr>
<tr>
<td>Conduct pilot project; e.g., private funding, heavy truck use</td>
<td>Direct user fees to cover some</td>
<td>User taxes: fuel excise taxes, excise taxes on trucks and tire sales; HVUC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Element 3: Encourage and Increase User-Based Pricing</th>
<th>Direct</th>
<th>Indirect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Require greater user-based pricing</td>
<td>Tolls, varied by distance, time of day, other relevant characteristics</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Conduct and disseminate research on freight pricing</td>
<td>None, except in unusual cases</td>
<td>User taxes: fuel excise taxes, excise taxes on trucks and tire sales; HVUC</td>
</tr>
<tr>
<td>Conduct pilot project; e.g., truck-only lanes</td>
<td>Tolls, varied by distance, time of day, etc., for some project costs</td>
<td>User taxes: fuel excise taxes, excise</td>
</tr>
</tbody>
</table>
In these cases, direct charging might seriously discourage participation; local users may not even be aware of the full value of the services to their agencies.

Table 5.1 suggests that the appropriate revenue sources for the federal share of major infrastructure projects (the first policy element) could vary somewhat with the nature and location of the project. The federal share of major highway improvements might also appropriately be financed by federal fuel and sales taxes or, in the future, by a VMT charge augmented by various more directly user-based fees, such as taxes on freight waybills. The federal share of intermodal facilities, particularly those involving international ports, are more fairly supported by fees related to international freight movement, such as container taxes and additional custom duties and fees.

Funding large-scale freight projects, as envisioned in Element 3, raises additional issues. To be consistent with the views of most analysts and stakeholders, the federal funds expended for such projects should be based on a user-pay principle. But the federal government rarely assesses direct user fees, so all federal contributions must be made from revenue sources that approximate the user-pay standard to
greater or lesser extent, until and unless there are federal VMT charges of some type.

To the extent possible, with given technology, users could be charged rates and fees that vary by time of day and vehicle characteristics that affect facility costs. Nearly all regular toll roads in both the United States and abroad charge differential rates for trucks to account for the variation in costs imposed on the highway by traveling in peak periods or using vehicles of different weight and axle configuration. For example, the New York State Thruway lowers truck fees during off-peak periods as an incentive to shift travel time. Many other tolled facilities vary their fees by vehicle weight. This means that, in general, the freight industry has become accustomed to fees and charges that vary by vehicle characteristics and perhaps time of day.

In the long run, imposing a charge for every vehicle mile traveled, a VMT tax, is likely to be the best alternative to fund freight or multimodal facilities. Distance-weight fees, which operate as simplified VMT taxes, have already been used for commercial vehicles in some U.S. states and several countries around the world (Germany being the best known) (Broaddus and Gertz, 2008; Estiot and Springer, 2007).

In the United States, four states currently have a distance-weight charge; trucks pay a tax per mile traveled within the state based on their registered gross vehicle weight, although mileage is self-reported. A major advantage of charging drivers for their actual mileage, and other important characteristics, such as weight, axle configuration, and time of day, is that this strategy avoids the many practical difficulties in using existing taxes (such as fuel or heavy vehicle fees) to charge trucks for the damage they do to the highway and the environment. While such a system could be adopted independently by individual states to charge freight carriers (and indeed all vehicles), a national system makes the most sense practically.

There are a number of ways to structure VMT fees, varying with specific goals. Even a simple flat fee per vehicle mile would raise significant revenue and more align the price of travel with the benefits received or the costs imposed on the highway. But the more the fee varied with actual use and damage, the more it would match the user-pay principle and provide sufficient revenue. There is some debate,
however, whether available technology is capable of implementation to do all this on a national level and how long it would take to build a comprehensive monitoring or measurement system and at what cost.

A recent NCHRP study (2009) concluded that the more sophisticated VMT applications were not yet practical and that simpler systems, such as having drivers voluntarily submit their yearly mileage totals, were unlikely to produce accurate information. The report did conclude that three concepts were technologically possible by 2015, although all will be based on assumptions that may strain the link between charges and the use of the system.

Some of the activities in Elements 2 and 3—conducting research on regulations and pricing, studies, and collecting and assessing data on freight pricing strategies—are not very amenable to direct user charges because beneficiaries tend to be spatially dispersed. As such, the largest share of these costs could also be funded by more indirect user fees, such as small increases in current fuel and truck taxes. At the same time, some of these studies, and particularly the pilot projects, may provide substantial local benefits to specific stakeholders, and they can be assessed some direct fees—for example, for the use of truck-only lanes.

But overall the need to conduct a demonstration project recognizes that we lack sufficient knowledge of shipper and business responses to various aspects of the project; at a minimum, it is possible that actual revenues will not meet projected costs. The federal government will need to guarantee revenues. Moreover, it is likely that the federal government will need to directly cover some project expenses, including monitoring travel behavior over time to test technological innovations, an approach consistent with current federal practice in many areas.

The largest component of the costs of research, data collection, synthesis and analysis of data, and dissemination of best practices would, by necessity, fall to the federal government. Specific users and local stakeholders may be expected to pay a substantial share of the direct costs of certain kinds of freight infrastructure pilot projects, such as truck-only lanes. However, almost by definition, these participants would be incurring substantial risks, given our limited knowledge of what truckers, shippers, and retailers will do in such situations
and how that varies by industry or commodity, etc. For most areas to actively consider piloting such efforts, the federal government would have to “backstop” their losses or the costs they incur in dealing with unexpected problems. Moreover, the federal government would have to fund independent researchers to fully evaluate the outcomes of these projects, their costs, and short- and long-term impacts.

To support the activities in Element 4—developing a national freight data architecture, assessing best practices, and building agency freight capacity—agency users could be directly charged for the services and materials they were provided through federal programs.

But it would be counterproductive to charge local beneficiaries the full costs of providing these assets; most direct user fees or charges are probably best set at marginal costs (e.g., travel, materials, the cost of duplicating or customizing data sets). The larger or up-front costs could be obtained from more indirect user fees, by relying on current funding sources that are related somewhat to freight system use. These could include a small share of federal excise taxes on fuel and truck and tire sales, re-allocating some funds from current funds dedicated to transportation planning, perhaps augmented by small charges on freight carried by water or rail.
 CHAPTER SIX
Summary and Conclusions

There are new, different, and growing demands on the U.S. freight network that threaten the productivity and competitiveness of the American economy. Many stakeholders and analysts believe that there is a need for a more focused and expanded federal role in freight transportation, but they do not agree on the details, including how that federal response should be funded. It is no longer possible to rely on traditional sources of revenue for many parts of the nation’s transportation network, particularly for U.S. highways and intermodal facilities. This leaves two crucial gaps: the first between freight demand and needed infrastructure, and the second between the dollars needed to address that gap and current revenues from traditional sources.

Most analysts, congressional commissions, and stakeholder groups agree, at least in principle, that a national freight policy should meet six overarching goals:

- Improve freight planning efforts by enhancing freight data, disseminating best practices and promising approaches, and increasing institutional capacity.
- Provide federal financial assistance to appropriate freight projects based on justifiable and sustainable revenue sources.
- Condition federal assistance to freight projects on specific and measurable performance criteria.
- Require federally supported freight projects to have a substantial user-pay component.
- Reform regulations that inhibit the competitiveness of various freight modes.
• Respond to market failures, such as the lack of cooperative efforts, and positive and negative externalities from freight projects.

This monograph has suggested four policy elements that collectively respond to all six policy objectives:

• Develop a federal capital freight assistance program using sustainable revenue sources, basing funding decisions explicitly on specific performance measures.

• Reform regulations that directly or indirectly inhibit or distort competition among freight modes or place financial restrictions on the participation of private stakeholders.

• Increase user-based pricing to improve the economic efficiency of the freight network and create a sustainable revenue source for federal freight programs, recognizing that these two goals are not always compatible.

• Enhance the ability of state, regional, and local planners to address pressing freight issues by improving the quality of freight data, knowledge of best practices, and the capacity of local institutions to effectively plan complicated and complex freight projects.

Ultimately, this strategy helps to calculate the appropriate federal share of a local freight or intermodal project and identifies the appropriate sources of user-related revenue needed to support that defined federal contribution. In particular, the strategy seeks to ensure that federal funds are spent in ways that are responsive to federal goals and performance standards, requiring that identifiable beneficiaries be expected to pay a share of project costs proportionate to the benefits they receive, while identifying important spillover costs and benefits. These spillovers may create federal responsibility for funding a share of project expenses or redressing significant losses in other jurisdictions, or both.

The strategy suggested in this monograph does not give one right answer, remove the politics from decisionmaking, guarantee that precious funds are never wasted on unneeded facilities, or ensure that freight projects get more federal support. The approach does give
decisionmakers an important tool to help ensure that projects that receive federal funds meet an acceptable minimum level of economic efficiency and create dispersed benefits that can be seen as having national significance. The use of this tool seems likely to give freight projects more prominence in local planning processes and more power in local lobbying efforts.

While the strategy acknowledges the work of other analysts and stakeholder groups, it offers an approach that differs from those previously offered. The approach described here rejects the notion that the federal government should automatically pay the major cost of a freight project because of the special nature of freight movement or its impact on the economy. It also rejects the view that the federal commitment should always be limited to costs that local and state participants cannot or will not cover.

While there is substantial support in principle among analysts and some stakeholders for developing user-based charges that could include both additional taxes and direct user prices, there is far less political will to do so. But it might be possible to implement some of the suggested regulatory and pricing changes within the confines of current federal assistance programs, by breaking down funding silos or making special efforts to encourage and shepherd the submission of multimodal and multijurisdictional freight projects for funding. Even in the current economic and political crisis, it still makes sense to raise these issues as Congress and the executive branch struggle to develop another national surface transportation funding bill.


CBO—See Congressional Budget Office.


FHWA—See U.S. Department of Transportation, Federal Highway Administration.


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NCFRP—See National Cooperative Freight Research Program.

NCHRP—See National Cooperative Highway Research Program.

OECD—See Organisation for Economic Co-operation and Development.


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TRB—See Transportation Research Board.


