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State and Local Infrastructure Financing

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1. Introduction

Our recent report to the National Association of Realtors, *State and Local Fiscal Trends and Future Threats,* documents the fiscal challenges faced by state and local governments. With a fiscal system designed 70 or 80 years ago and important trends which are typically beyond the control of state and local policy makers, state and local governments find it increasingly difficult to raise the revenues required to provide the level and quality of services demanded. At the same time, demographic and economic trends are increasing the demand for goods and services provided by state and local governments.

In this fiscal environment, spending on state and local infrastructure is most vulnerable – particularly spending on operations and maintenance, which is less visible than spending on new capital projects. Infrastructure spending should rank as a high priority for state and local governments. As the National Council on Public Works Improvement concluded in their final report *Fragile Foundations*,

> "We must ensure that our highways and subways can move us swiftly and safely; that our homes, farms, and industries are supplied with ample clean water; that we reduce and safely dispose of the increasing volume of poisonous wastes our society generates; and that we provide the structural underpinning for a robust and competitive economy."

State and local governments are the providers of the key infrastructure that keeps our economy competitive and our society functioning and healthy. The purpose of this project is to present a reconnaissance of current state and local infrastructure trends and practices. The project consists of two phases. The first phase presents an overview of state and local infrastructure spending, general financing mechanisms and traditional policy tools for setting spending priorities. The second phase will look at various case studies to provide a more in depth picture of how specific financing mechanisms and management tools are actually implemented by state and local governments.

Phase 1 of the project has four distinct sections. The first section reviews actual spending by state and local governments on infrastructure networks. These data come from the Census of Governments published by the U.S. Census Bureau every five years. For the purposes of this study we focus on infrastructure systems important for a strong economy and safe environment. Specifically, we look at seven infrastructure categories:

- Highways, streets, roads and bridges
- Air transportation
- Transit
- Ports and waterways
- Solid waste management
- Sewerage
- Drinking water.

We do not include in this analysis other public infrastructure facilities like hospitals, schools, courts, jails, and other public buildings that are generally regarded as social infrastructure, rather than economic infrastructure. In addition, we also exclude from our definition telecommunications and energy production and distribution networks because they are primarily provided by the private sector, albeit they are regulated by the public sector. While there is always some subjectivity in developing such a definition, our definition of infrastructure follows general practices in this field and is appropriate for our purposes.

The second section then reviews recent federal grants to state and local governments for infrastructure purposes. A section that reviews traditional infrastructure financing mechanisms follows that. The next section then summarizes traditional approaches to setting spending priorities for infrastructure projects. The final section summarizes what has been learned from this initial reconnaissance and discusses next steps for Phase 2 of this project.

2. State and Local Government Infrastructure Spending Trends

The purpose of this section is to present data on aggregate state and local infrastructure spending – for the nation and for the 50 individual states.[1] We collect data for and report spending trends for each category of infrastructure including total spending by category and capital spending by category. We look at these data for the most recent year available (at this time Fiscal Year 2002) and 1992 to see what changes have taken place over that decade. We report relative measures of infrastructure spending by state including per capita spending, as well as spending as a share of personal income.

These data come from the Census of Government reports, conducted by the U.S. Bureau of the Census, for 1992 and 2002. The data report state and local government spending each fiscal year for individual infrastructure categories. These expenditure data, however, have limitations. The following caveats are important:

- First, the capital component of public works expenditures often is only an input in the production of pubic works services, while it is the output that ultimately matters to the public. For example, consumers demand a certain quality of water. Thus, there is a need for a treatment and distribution system that must be viewed in the context of how such a system affects the level and quality of service being provided.

- Second, expenditure data are not meaningful unless the user understands that these funds could be spent on other public or private goods. If each extra dollar spent on pubic works investments were free to society, in terms of not having to sacrifice resources for other uses, more infrastructure expenditures always would be preferred to less. However, such zero cost conditions do not exist.Third, national estimates of public works expenditures made by the Census Bureau, or other federal agencies, are typically based on standardized definitions and measurement techniques. This standardization is crucial if the numbers are to be used for any consistent discussion of nationwide issues or trends. However, national trends that are identified in this way may not necessarily hold for any given state or locality. Moreover, because states do not apply uniform standards in measuring spending (including such things as the definition of capital versus operating expenditures), their annual reports fail to provide reliable data for comparing infrastructure conditions nationally.

- Fourth, because the data collected are aggregated, it is not clear always what is included in public works improvement "outlays." For example, operating and maintenance figures are not separated. Indeed, these expenses may include items not necessarily related to the level and quality of infrastructure services being provided.

[1] The tables in this report present summary data for the 50 state and local systems in the U.S. Backup tables with data for each of the 50 states are included in the Statistical Appendix.

- Finally, expenditure data do not provide any information on whether the level and quality of services by infrastructure systems or networks have declined, stayed about the same, or improved. Yet, such information is critical for decisions to allocate scarce public works dollars among competing demands [NCPWI 1986, p. 53].

The data in Table 1 summarize total state and local spending by infrastructure category for 2002 and 1992. In 2002, state and local governments spent an estimated $263.5 billion on the infrastructure categories included in this study. That is up from $157.6 billion in 1992. In other words, state and local governments increased total spending on infrastructure systems by 67.3 percent from 1992 to 2002 –38.8 percent after adjusting for inflation.

The data also document a slight change in state and local infrastructure priorities – the relative share of transportation infrastructure increased during the period. Specifically, state and local spending on transportation networks accounted for 65.6 percent of total state and local infrastructure spending in 2002, compared with 63.0 percent in 1992. Spending on air transportation experienced the largest increase in relative share during this period. Similarly, infrastructure spending on solid waste management, sewerage and drinking water declined during the decade from 37 percent of state and local infrastructure spending in 1992 to 34.4 percent in 2002. Spending on sewerage experienced the largest decline in relative importance.

Table 1
Total State and Local Infrastructure Spending by Category, 2002 and 1992
(Millions of Dollars and Percent)

Category	2002 Spending	Share of Total	1992 Spending	Share of Total
Highways	$115,467.5	43.8%	$67,351.5	42.7%
Air Transport	$16,209.2	6.2%	$8,275.6	5.3%
Transit	$37,468.3	14.2%	$21,793.8	13.8%
Ports	$3,571.1	1.4%	$1,898.7	1.2%
Solid Waste	$19,047.5	7.1%	$12,394.1	7.9%
Sewerage	$31,238.5	11.9%	$21,008.6	13.3%
Drinking Water	$40,526.9	15.4%	$24,833.9	15.8%
TOTAL	$263,529.0	100.0%	$157,556.2	100.0%

Source: U.S. Census Bureau

The data in Table 2 highlight the fact that local governments generally provide the basic infrastructure services that provide the structural underpinning for a robust and competitive economy and enhance the overall quality of life for families. While local governments account for two-thirds of total state and local infrastructure spending, they account for the vast majority of spending in every infrastructure category examined here, with the sole exception of highways, streets, roads and bridges.

Table 2 Local Share of Infrastructure Spending by Category, 2002	
Category	Local Share of Spending
Highways	38.3%
Air Transport	92.8%
Transit	78.1%
Ports	71.6%
Solid Waste	85.6%
Sewerage	96.6%
Drinking Water	99.1%
TOTAL	67.4%

Source: U.S. Census Bureau

The data in Table 2 is aggregate data for the nation as a whole. There is substantial variation across states with regard to the role local governments play in providing infrastructure services. For example, there are 9 states where local governments account for more than three-quarters of total state and local spending on infrastructure services. Alternatively, there are 16 states where local governments account for less than half of total state and local infrastructure spending. Table 3 lists the top and bottom 5 states in terms of the local share of total state and local infrastructure spending.

Table 3 Top and Bottom Five States Based on Local Share of Total State and Local Infrastructure Spending, 2002			
Top Five States		Bottom Five States	
State	Local Share	State	Local Share
Michigan	82.3%	West Virginia	24.4%
California	81.5%	Rhode Island	30.1%
Colorado	77.9%	New Jersey	30.5%
Minnesota	77.9%	Montana	34.4%
Oregon	77.6%	New Mexico	37.1%

Source: Staff compilations.

There is also substantial variation across states in terms of infrastructure spending per capita. Table 4 presents data on average national per capita total state and local infrastructure spending by category in 2002 and 1992, as well as the percent change between 2002 and 1992. As expected, per capita spending on highways, streets, roads and bridges is greater than per capita spending for any other infrastructure category. Also, the data indicate that per capita spending on transportation related infrastructure categories grew faster during this decade than spending on other categories of infrastructure.

Table 4 Per Capita Total State and Local Infrastructure Spending, By Category, 2002 and 1992			
Category	Per Capita Spending 2002	Per Capita Spending 1992	Percent Change
Highways	$410.30	$261.44	56.9%
Air Transport	57.60	31.80	81.1%
Transit	133.14	82.35	61.5%
Ports	NA		
Solid Waste	67.68	47.23	43.3%
Sewerage	111.00	82.12	35.1%
Drinking Water	144.01	97.38	47.8%

Source: Staff compilations.

Per capita spending on individual categories of infrastructure varies significantly across state and local systems. For example, in 2002, excluding Alaska, eight states spent more than $600 per state resident on highways – Wyoming ($965.81), South Dakota ($768.49), North Dakota ($717.40), Colorado ($659.33), Nevada ($636.13), New Mexico ($628.58), Iowa ($602.14) and Montana ($601.44). All of these states are in the west and are large states with relatively small populations. On the other hand, eight states have per capita total state and local spending on highways of less than $350 – Tennessee ($311.68), Rhode Island ($316.09), Michigan ($323.89), Indiana ($334.06), California ($338.53), Louisiana ($342.48), Hawaii ($345.55), and Oregon ($349.80).

In our previous study to the National Association of Realtors, *State and Local Fiscal Trends and Future Threats,* we documented the decline in state and local own-source revenues and tax revenues relative to personal income. For example, between 1002 and 2002

- State and local government own-source revenues declined from 16.6 percent of personal income in 1992 to 14.9 percent in 2002;
- State own-source revenues accounted for 9.1 percent of personal income in 1992, but declined to just 8.2 percent in 2002;
- Local own-source revenues accounted for 7.5 percent of personal income in 1992, but just 6.7 percent in 2002; and
- State and local tax revenues equaled 11.6 percent of personal income in 1992, but declined to just 10.2 percent in 2002.

Spending on infrastructure experienced a similar decline relative to personal income from 1992 to 2002, albeit to a lesser degree because it is a much smaller share of personal income to start with. For example, highway spending accounted for 1.4 percent of personal income in 1992, but declined slightly to 1.3 percent in 2002. All other transportation infrastructure (airports and transit) accounted for just .6 percent of personal income in 2002.

3. Federal Grants to State and Local Governments for Infrastructure Programs

The previous section presented information on state and local spending for six categories of infrastructure. The purpose of this section is to examine the contribution made by federal grants to state and local infrastructure spending. Data on federal grants to state and local governments for infrastructure programs was collected from the 2002 Consolidated Federal Funds Report (CFFR), which includes data for 1,055 federal grant programs.[2]

There are actually a number of different tools available to the federal government to help state and local governments finance infrastructure investments. In addition to federal grants to state and local governments for these purposes, the federal government also has available the following types of tools:

- *Cooperative cost-sharing agreements* in which nonfederal cost sharing is involved for specific projects. For example, projects by the U.S. Army Corps of Engineers used to be considered direct federal expenditures with state and local governments making in-kind contributions – e.g. gifts of land, easements, rights-of-ways etc. But now state and local governments are expected to share planning and construction costs in accordance with agreements negotiated specifically to meet the needs identified in each project.

- *Federal loans and loan guarantees* which provide subsidies to state and local government infrastructure investments.

- *Federal tax expenditures* which are special exclusions, exemptions or deductions allowed under the Internal Revenue Code to encourage certain types of investment by individuals and corporations. The infrastructure portion of federal tax expenditures has been declining [NCPWI 1986, pp. 56-63].

For the purposes of this report, we look only at federal infrastructure grants to state and local governments.

In this context, we reviewed the 1,055 federal grant programs listed in the 2002 CFFR and developed seven infrastructure categories based on the titles of individual grant programs – highways, air transportation, transit, solid waste, sewerage, drinking water, and federal infrastructure grants not easily allocated to the other categories. This is a somewhat subjective process and the figures should be regarded as approximations of federal infrastructure grants

[2] The CFFR contains data by state on federal obligations for individual programs. In the budget process, program funds are authorized, appropriated, obligated, and finally spent (outlays). Congress determines the first two amounts and program agencies and recipient governments determine the last two. The major different between obligations and outlays is the timing of actually expenditures. Obligation data identify declines in federal commitments for individual programs sooner than outlay data. Since we are interested in identifying and describing programmatic priorities, obligations data are the best data to analyze. If we were interested in the actual economic impact of specific grant programs, we would analyze outlay data.

because it is difficult to determine the purpose of a grant program from looking at program titles alone.

In FY2002 the federal government made a total of $415.2 billion in grants to state and local governments for all purposes. Of that total, approximately, $46.3 billion were for what we have defined as infrastructure related programs – approximately 11.2 percent of all federal grants to state and local governments in 2002.

Based on the information available for individual grant programs from the CFFR, programs were grouped into the seven categories listed above. Table 5 provides a summary of the programs examined in this section. In addition, Table 5 contains similar information on federal infrastructure grant programs in 1990 based on data in Mann and Bell (1993).

The data indicate that in 1990 the federal government had approximately 36 infrastructure related grant programs for state and local governments totaling approximately $20.5 billion. By 2002 the number of infrastructure related grant programs increased to approximately 52 with total funding increasing to $46.3 billion. Adjusting for inflation, federal infrastructure grants to state and local governments increased by 77 percent.[3]

Table 5
Federal Grants for Infrastructure Purposes
Number of Programs and Total Dollars, 2002 and 1990

Category	2002		1990[4]	
	Program Number	Program Amount (Millions of $)	Program Number	Program Amount (Millions of $)
Highways	3	32,519.6	3	13,714.6
Airports	3	2,861.2	1	1,353.5
Transit	6	6,833.8	7	3,181.7
Solid Waste	1	7.3	5	58.1
Sewerage	4	103.2	13	1,482.7
Drinking Water	18	1,295.8	4	5.3
Other	17	2,724.9	3	723.1
TOTAL	52	46,345.8	36	20,519.0

It is clear from the data in Table 5 that the federal highway programs are the largest federal infrastructure grant programs to state and local governments. Data in Table 6 indicate that federal highway programs accounted for about 70.2 percent of federal infrastructure grants to state and local governments in 2002, compared with 66.8 percent in 1990. In fact, federal infrastructure grant programs for transportation (highways, airports, and transit) accounted for 91.1 percent of all federal infrastructure grants to state and local governments in 2002, up slightly from 88.9 percent in 1990.

[3] Using the GDP Implicit Price Deflator from Table B-3 in the 2005 Economic Report to the President.
[4] Data for 1990 comes from Mann and Bell (1993).

In non-transportation related federal infrastructure grants to state and local governments the only major trend between 1990 and 2002 was the decline in relative importance of grants for wastewater treatment, or sewerage. In 1990, 7.2 percent of federal infrastructure grants to state and local governments were for wastewater treatment; while the relative share declined to just 0.2 percent in 2002. In a somewhat related area, grants to improve and protect drinking water supplies accounted for 0.0 percent of federal infrastructure grants to state and local governments in 1990, but increased to 2.8 percent of the total in 2002 and account for more than a third of all federal infrastructure grant programs in 2002.

Table 6
Share of Federal Infrastructure Grant Programs
By Category and Dollar Amounts, 2002 and 1990

Category	2002		1990	
	Pct. Of Programs	Pct. Of Dollars	Pct. Of Programs	Pct. Of Dollars
Highways	5.8	70.2%	8.3%	66.8%
Airports	5.8	6.2%	2.8%	6.6%
Transit	11.5%	14.7%	19.4%	15.5%
Solid Waste	1.9%	0.0%	13.9%	0.3%
Sewerage	7.7%	0.2%	36.1%	7.2%
Drinking Water	34.6%	2.8%	11.1%	0.0%
Other	32.7%	5.9%	8.3%	3.5%
TOTAL	100.0%	100.0%	100.0%	100.0%

While federal highway grants to state and local governments account for the vast majority of federal infrastructure grant funds, not all state and local systems benefit equally from such programs. For example, the top five states in terms of total highway grants received (California, Texas, Pennsylvania, Maryland and New York) account for 27.4 of all federal highway grants. For the nation as a whole, highway grants accounted for 7.8 percent of total federal grants to state and local governments. Table 7 presents the top five and bottom five states in terms of highway grants as a share of total federal grants to each state and local system. The range is from 2.3 and 2.6 percent of total federal grants in Illinois and New York respectively, to 22.8 and 20.8 percent for Hawaii and Idaho, respectively.

Table 7
Top and Bottom Five States
Highway Grants as a Share of Total Federal Grants, 2002

Top 5 States	Pct.	Bottom 5 States	Pct.
Hawaii	22.8	Illinois	2.3
Idaho	20.8	New York	2.6
North Dakota	17.5	Florida	3.0
Montana	17.2	Georgia	4.3
South Dakota	16.3	Massachusetts	4.7

Similar variations exist across states when looking at highway grants per capita. For the country as a whole, federal highway grants to state and local governments averaged $1,475 in 2002. The range was from a high in Wyoming of $2,498 per capita to just $921 per capita in Nevada. Table 8 reports information on the top and bottom five states when ranked by federal highway assistance per capita.

Table 8
Federal Highway Aid Per Capita, 2002
Top and Bottom Five States

Top 5 States*	Per Capita Grant	Bottom 5 States	Per Capital Grant
Wyoming	$2,498	Nevada	$ 921
New York	$2,238	Florida	$1,024
North Dakota	$2,220	Virginia	$1,091
New Mexico	$2,176	Colorado	$1,102
Montana	$2,120	Indiana	$1,146
* Excluding Alaska and Washington D.C.			

In terms of federal dollars, transit grants to state and local governments account for the second largest share of funding, behind highway grants. Together, highway and transit grants account for 85 percent of total federal infrastructure grants to state and local governments in 2002.

Federal infrastructure grants for transit purposes are even more concentrated than federal highway grants. Specifically, four states (California, New York, New Jersey and Illinois) receive 47 percent of federal infrastructure grants to state and local governments for transit. Federal aid for transit accounts for 1.1 percent or less of federal grants to state and local governments in twenty-eight states. In two states, federal transit assistance accounts for more than 20 percent of total federal grants – Idaho (21.2 percent) and Hawaii (20.4 percent).

4. Tools for Financing State and Local Infrastructure Spending

Having devastated the city of New Orleans, Hurricane Katrina and its immediate aftermath revealed the vulnerability of poorly maintained urban infrastructure and further posed serious challenges to financing the post-disaster reconstruction. How will the municipal government be able to raise sufficient funds to rebuild the streets, the highways and the bridges as well as run down and poorly maintained levees? New Orleans' troublesome situation, however, may turn out to be just the tip of the iceberg. State and local governments face dual pressures from citizens: on the one hand, there is increasing citizenry's demand for public services – both a higher level and quality of services. At the same time, however, there is a continued reluctance to pay for such services through higher taxes. As a result, many local governments are struggling to manage their infrastructure needs with the same financing tools they used three decades ago (Cox, Wendell, Utt, and Corcoran 2003a; Cox, Wendell, Utt, and Corcoran 2003b). The declining relative importance of infrastructure assistance from the federal and state governments, due to their own budget shortfalls, has further strained the public works coffers of local governments (NLC 1987; CETS 1996; Cox, Wendell, Utt, and Corcoran 2003b).

Infrastructure commonly refers to such capital facilities as roads, bridges, airports, and wastewater treatment plants. The National League of Cities (NLC) in its 1987 study stressed that the efficacy of an infrastructure system should be measured not only by the investment in physical structures but also by the services that the investment provides, which matter a great deal to industries and individuals alike. The construction, operation, and maintenance of public infrastructure, and the community's capacity to fund these activities are closely linked to the pace and quality of economic growth (Feldman, Mudge, and Rubin 1988; GFRC 1983; Smith 2005). Infrastructure may stimulate future investment or economic activity through "a multiplier effect on private firms or other public agencies" (NLC 1987, p. 6). Well-operated and maintained infrastructure provides travel timesavings, clean water, and reduced vehicle operating costs, but also market access, productivity, and health and safety benefits (Mudge 1996). In addition to its strong impact on economic development, high investment costs, long economic life, and interaction with other parts of a system, public infrastructure includes various modes: highways, mass transit, air transportation, water transportation, water supply and sewerage (Feldman, Mudge, and Rubin 1988; NLC 1987).

Given its capital-intensive nature, high investment risks, and the public interest involved, public works infrastructure has traditionally been owned, operated, and financed by governments at various levels (Merna and Njiru 2002). The public goods features of most infrastructure projects make some public sector involvement almost mandatory (Feldman, Mudge, and Rubin 1988; Mudge 1996). Intergovernmental grants and own-source revenues (composed of taxes and user fees) are traditionally the primary sources of funding for transportation and other modes of public works (Morris 2001; Moulder 1993). The emerging "service creep"—the phenomenon that the same population generates over time an increased demand for services (Tischler 1996), the persistent popular antagonism against higher taxes, and the ever-growing costs for construction, operation, and maintenance, have conspired to exacerbate the fiscal stress of state and local governments. They are thus obliged to seek out innovative tools for capital financing. Over the past two decades, infrastructure finance at the state and local level has seen the gradual shift from pay-as-you-go financing to debt financing (Morris 2001; Mudge 1996), the trendy

movement toward privatization or public-private partnership (Cox, Wendell, Utt, and Corcoran 2003a; Feldman, Mudge, and Rubin 1988; Merna and Njiru 2002; Weiss 1985), and the change of perspective from a single mode basis to a multimodal basis (Morris 2001; NCSL 2005; TRB 2002).

Debt financing tools such as bonds, loans, loan guarantees, and lines of credit, have grown into a popular alternative to pay-as-you-go financing, which limits public works projects to existing funds. One major advantage of debt financing is that it provides immediate revenue that allows for sooner delivery of projects to satisfy citizen needs (Morris 2001). Debt financing is also consistent with the benefits-received principle of public finance because it aligns consumers of infrastructure services with those who pay for those services. Specifically, construction costs are spread over the project's life and are paid for by the user. On the other hand, however, this tipping of balance between debt and pay-as-you-go has aroused concern over the appropriate level of reliance on debt finance (TRB 2002). It could affect the fiscal health of public works investments in the long run.

With an attempt to shift the burden of financing away from taxpayers to the beneficiaries of any given improvement or construction of infrastructure, state and local governments have been encouraging a greater private sector role in capital financing (Feldman, Mudge, and Rubin 1988; Merna and Njiru 2002). Public-private partnerships represent "the fastest-growing tool" of infrastructure finance (Feldman, Mudge, and Rubin 1988, p. 55), which in its simplest form, combines public ownership and private operation of public works facilities. Transportation projects, in particular, exemplify an area in which states and localities have been successful in attracting private sector participation (Morris 2001; NCSL 2005). Private firms may take on the finance, design, and construction of a toll road, while governments are responsible for authorizing the collection of tolls, assessing workmanship, and ensuring that environmental standards are met (Morris 2001). Acknowledging the importance of private involvement in capital finance, Mudge (1996) in the meantime cautions that public sector must retain a leading role in privatizing public works for the approach to be effective.

Different financing tools may assume different degrees of importance as the modes of public infrastructure vary. Take debt finance for instance. Debt in the early 1980s accounted for about half of state and local capital financing for public water supply systems and 90 to 95 percent of airport financing, in contrast to 10 to 20 percent of highway financing, and 20 percent of transit financing except for New York (Feldman, Mudge, and Rubin 1988, p.33). Prompted by the need to support a national transportation system that is multimodal, infrastructure-financing approaches have started to develop on an integrated, multimodal basis (TRB 2002). Some states, incorporate concerns of intermodal connectivity in funding their new projects (NCSL 2005).

Along with the general trends captured above, state and local governments have been pushed to refine and expand their traditional infrastructure tool kit with innovative financing tools. Ensuing is a brief summary of both capital-financing tools that are widely used in all states and those that have been experimented with by a number of states and localities. A discussion of their respective strengths and weaknesses is also provided.

Taxes and Fees

State and local infrastructure investments were typically finance by General Obligation Bonds, or on a pay-as-you-go basis. In each case, state and local governments relied on current general revenues to either pay off the general obligation bonds used to finance the capital investment, or to put funds aside for future capital investments. The main source of funding in each case was general revenues, primarily from general taxes.

In an earlier report to the National Realtors Association, *State and Local Fiscal Trends and Future Threats,* we documented the declining relative importance of taxes as a source of revenue for state and local governments. In 1992 state and local governments, in the aggregate, generated 70 percent of their own-source revenues from taxes. By 2002 taxes accounted for just 68 percent of state and local own-source revenues. In 1980, taxes accounted for 74.7 percent of total state and local own-source revenues.

Between 1992 and 2002, real per capita state general revenues increased 16.3 percent, while real per capita tax revenues increased just 13.5 percent and real per capita property taxes collected by states actually declined by 7.5 percent. Similarly, real per capital own-source revenues for local governments increased 16.4 percent from 1992 to 2002, while real per capita local tax revenues increased just 13.8 percent and property real per capita property tax revenues increased just 9.8 percent – the smallest increase of any individual revenue source for local governments.

As a result of these trends, taxes, and property taxes especially, account for a declining share of state and local own-source revenues. This has put pressure on state and local governments to find more creative ways of financing infrastructure investments, including greater reliance on user fees.

Governments at all three levels—federal, state, and local—play a significant role in financing public infrastructure. The federal government contributes to state and local infrastructure through either direct expenditures in the form of grants or indirect expenditures in the form of tax credits, loans, and loan guarantees (Feldman, Mudge, and Rubin 1988). The use of excise taxes and user fees is especially prominent in transportation finance. Federal transportation funds are composed mainly of fuel taxes, which account for 90 percent of the revenues deposited into the Federal Highway Trust Fund (Morris 2001), which is responsible for 75 percent of all highway and mass transit capital expenditures (in 2001). State governments also rely on user taxes and fees as their primary sources of funding. These taxes and fees include state motor fuel taxes, vehicle licenses and registration fees, emission fees, and sales taxes. Due to variations in state tax structures, not all user revenues are designated for transportation disbursements. In many states, local governments also levy gas and vehicle sales taxes (Morris 2001). Such taxes are generally, albeit not universally, earmarked for transportation projects.

User taxes and fees have been considered by many to be an equitable and efficient way to spread the financial burden of public works projects, as they relate pay in some way to use. Their sensitivity to technological advances in alternative fuel technologies and changing driver demographics, however, makes them less viable as a funding source (Morris 2001; TRB 2002).

One can also argue that vehicle-related fees are not exactly proportional to the vehicle's use of the state transportation system as vehicle weight and gasoline efficiency vary (Morris 2001). There is also concern that reliance on fuel taxes may work against energy conservation and air quality by providing wrong incentives for departments of transportation (DOTs) to encourage greater gas consumption (TRB 2002). Morris (2001) calls for greater state commitment of vehicle revenue to transportation funds as a way to increase funding without raising taxes or fees.

Intergovernmental Funds

As states aspire to federal grants to help finance their public works projects, local governments rely on contributions from both state and federal governments to alleviate their fiscal problems. Major forms of intergovernmental financing include transportation funds made more widely available by the Transportation Equity Act for the 21st Century (TEA-21), Grant Anticipation Revenue Vehicles (GARVEE) bonds, State Infrastructure Banks (SIBs), and State Revolving Funds (SRFs).

I. TEA-21 Funds

Enacted in June 1998, TEA-21 brought unprecedented levels of federal funding for transportation projects by linking spending from the Highway Trust Fund to highway revenues (Morris 2001). It established a minimum guarantee that ensures that highway funds are distributed equitably among the states. State and local jurisdictions thus have an incentive to increase their funding levels to match the federal commitments (Cox, Utt, and Corcoran. 2003a). As part of the TEA-21, the federal Transportation Infrastructure Finance and Innovation Act (TIFIA) devises new tools of credit assistance—secured federal loans, loan guarantees, and standby lines of credit—which provide greater funding flexibility to state and local governments (FHWA 1997). The benefits of TEA-21 have been severely compromised, however, by the recent difficult economic and budget conditions that confront the federal and state governments. Washington finds it hard to increase financial commitment to transportation enhancements, while states can hardly raise the matching funds needed to pay their share of the project costs (Cox, Utt, and Corcoran. 2003a).

II. GARVEEs

GARVEEs are bonds or notes that are bought by investors with the debt to be repaid by the issuer's pledge of future federal highway funds. They effectively accelerate future federal revenues to finance transportation projects (Morris 2001; NCSL 2005). GARVEEs may be backed solely by federal funds to repay principal and interest on bonds or may be backed by additional state funds. They are special obligations of the issuing state or transit authority, but do not constitute general obligations of the issuing entity or of the federal government (Cox, Utt, and Corcoran. 2003a). They are particularly useful for projects for which the costs of delay outweigh the costs of financing. Eligible projects are usually large enough to merit borrowing and lack access to a revenue stream, such as taxes and tolls. The jurisdiction that issues a GARVEE bond today has to forego alternative future uses of the anticipated federal funding. In addition to the limits states impose on the volume of debt, GARVEE is subject to the risk of federal funding reauthorization (Cox, Utt, and Corcoran. 2003a).

III. State Infrastructure Banks

SIBs are state or multi-state funds that operate like private banks and provide transportation funding in the form of loans, lines of credit, and other credit enhancements to help states deliver capital facilities sooner (Morris 2001). Mudge (1996) argues that SIBs, embody many nice properties as an innovative finance tool. They allow subsidies to needy projects without sacrificing their market orientation. Projects that benefit must pass a partial market test of repaying debt. They encourage planners and decision makers to take a long-term view as the bondholder is paid back over 20 or 30 years. Especially helpful for large projects, SIBs also offer considerable funding flexibility. They can accommodate local conditions and can be multimodal (Mudge 1996). The advantages of SIBs are seriously constrained by the fact that not all states have been made eligible and the distribution of the funds is highly concentrated in a small number of states (Cox, Utt, and Corcoran. 2003a).

IV. State Revolving Funds

SRFs provide low-cost loans to local communities while loan repayments are recycled back into the program to fund future projects. SRF loan recipients repay both principal and interest, thereby ensuring increasing levels of funding. Funds to capitalize SRF programs are provided through annual federal grants to states and state matching funds. The revolving mechanism and annual capitalization grants with state matches secure a stable and growing source of funds for infrastructure projects, especially for water quality projects through the Clean Water State Revolving Fund (CWSRF). One major drawback of SRF programs is their reliance on annual capitalization grants. It is unfortunate for SRFs that the federal government has reduced its commitment to funding SRF projects.

Bonds

Cox, Utt, and Corcoran (2003a) find that bonds, especially general obligation bonds (GO bonds), have been "the financing mechanism of choice" for most local governments while bond banks and revenue bonds emerge as promising alternatives. Back in 1991 however, an infrastructure financing survey of local officials reported that the greatest percentage of funds for capital financing came from the general fund and state and federal funds followed as the second high. Only less than half of the respondents ever use GO bonds. Impact fees and revenue bonds were reported as the least used tool of financing.

I. General Obligation Bonds

Also known as "full-faith-and-credit bonds", GO bonds, the most traditional form of debt issuance by state and local governments, are secured by the issuer's pledge to levy enough taxes to pay off principal and interest. Enjoying low, tax-exempt rate of interest, GO bonds allow states and localities for immediate funding of a project and they spread the costs over the useful life of the capital facility (Feldman, Mudge, and Rubin 1988; Cox, Utt, and Corcoran. 2003a). GO bonds typically require voter approval or legislative approval. There may be statutory

limitations on the volume of debt a jurisdiction can carry. In addition, infrastructure projects usually have to compete for being financed with GO bonds.

II. Bond Banks

Bond banks are state-sponsored entities that permit municipalities to obtain access to the national debt market. They offer and sell bonds, and loan the proceeds to municipalities within the state to subsidize public works projects (Feldman, Mudge, and Rubin 1988). By pooling smaller issuers and backing them with the state's credit, bond banks reduce the cost of borrowing for local jurisdictions (Cox, Utt, and Corcoran. 2003a). If a state enjoys a high credit rating, the municipality would benefit from a lower interest rate. Bond banks are particularly helpful for projects that are too small to be sold publicly. They also provide local communities with technical and administrative expertise in debt issuance (Cox, Utt, and Corcoran. 2003b).

III. Revenue Bonds

Revenue bonds are limited-liability obligations, secured by a pledge of specific revenue streams associated with the target project, instead of the issuer's general taxing power. Unlike GO bonds, revenue bonds are not subject to debt limitations and they usually do not require voter or legislative approval. On the other hand, however, they entail a higher interest rate due to the issuer's limited repayment obligation (Cox, Utt, and Corcoran. 2003a).

Leasing

Typically used for equipment acquisitions, lease financing has become an important tool to finance state and local jurisdictions' capital improvement programs (CIPs)

I. Tax-Exempt Municipal Lease Finance

Municipal leases come in the form of a series of one-year renewable obligations that are to be repaid by money appropriated annually from the municipality's general fund. The interest component of the municipality's rental payments is exempted from federal income tax for the owner of the lease, who can be an independent leasing company or leasing subsidiary of a bank, or a trustee bank. A "non-appropriation clause" in the lease allows the jurisdiction to terminate the lease without penalty. The lessor then has the right to take procession of the leased property. Leasing is a more flexible financing alternative to bonds as makes available low interest rates and spread the costs over time. Leasing does not require voter approval and is not subject to statutory debt limitations (Cox, Utt, and Corcoran. 2003a).

II. Certificate of Participation Financing

As another alternative to cash purchases or bonds, certificates of participation (COPs) are the most commonly used form of leasing. COPs are undivided proportionate interests in a lease purchase agreement. The certificates are serialized, with a portion maturing each year. The owner of a particular certificate receives tax-exempt interest annually. The interest payment comes from annual appropriation. As certificates permit a lease purchase agreement to be

divided into small denominations, they allow for access to all investor groups (Feldman, Mudge, and Rubin 1988). COPs can also bypass voter approval or debt limitations to which GO bonds are subject. They are not yet permissible in all states and their interest rates are generally higher than bonds as third party investors view them as a riskier investment (Cox, Utt, and Corcoran. 2003a).

Special Financing Districts: Tax Increment Financing

Tax Increment Financing (TIF) is a means of financing public investments like infrastructure improvements. A typical TIF program freezes local property assessments in a specific geographic area (TIF district), and then earmarks increases in property taxes that result from future property value increases to repayment of TIF expenses or tax increment bonds. Some 48 states have passed legislation authorizing the use of Tax Increment Financing by local governments. [Johnson and Man, 2001] It is considered an equitable financing tool as the costs and benefits of redevelopment projects are borne by all property owners within the district. It may increase tax revenue without raising rates or imposing new taxes. The effectiveness of the tool, however, is highly dependent upon the status of the macroeconomy as well as the performance of the projects (Cox, Utt, and Corcoran. 2003a; NLC 1983). Some argue that the tool is really involved in shifting activity from outside the TIF district to inside the TIF district and, as such, is really a zero sum game when it comes to economic development.

TIFs are generally thought to mean property tax increment financing. However, seven states have used incremental sales and/or business tax revenue to finance infrastructure investments. By comparing the strengths and weaknesses of sales tax TIFs with those of the traditional property tax TIF, Mikesell concludes that nonproperty taxes are less suited for use in TIF programs then are property taxes. [Mikesell, 2001]

Another special district used to finance infrastructure investments is the Community Facilities District (CFD). Typically, landowners in an area take the initiative to form a CFD for the purpose of issuing debt to finance infrastructure projects needed to develop the land in the CFD. A lien for CFD assessments is put on each parcel in the district and the CFD tax liability appears on the property tax bill for each property owner as a separate line item. Usually local governments must approve the creation of CFDs, albeit debt issued by CFDs is not subject to voter approval and is not included on the books of the local government. [Chapman and Facer]

Privatization/Public-Private Partnerships

Privatization has been a contentious as well as appealing alternative to public monopoly (Merna and Nijru 2002). In cases where the public owns infrastructure, competitive contracting may attract qualified private firms to take over the day-to-day operations of the facility and generate efficiency gains for residents. Privatization in the form of public-private partnerships refers to any contractual arrangement whereby some physical infrastructure is provided to the jurisdiction by a private sector partner (Cox, Utt, and Corcoran. 2003a). Public-private partnerships for developing public works may either focus on changing the fundamental basis upon which public activities are undertaken by the private sector or be geared toward a more effective involvement of the private sector in the provision of public services (Feldman, Mudge,

and Rubin 1988). Government contracting-out, for instance, has created a mechanism to transfer traditional government responsibilities to the private sector. Voucher is another way of shifting the public-private balance. Asset sales, in which the government sells assets and its right to provide services altogether, bring about more fundamental change to institutional arrangement for developing infrastructure (Feldman, Mudge, and Rubin 1988; Weiss 1985).

Alternatively, public-private partnerships can expand third party participation in the process by bringing in private sector providers to help design, finance, build, and sometimes operate elements of a jurisdiction's infrastructure. Such partnerships may have the potential to lower service costs, and to deliver results in a more timely fashion. By shifting part of the responsibility of financing to the private partner, the community may ease more of their general funds for other purposes (Cox, Utt, and Corcoran. 2003a). In spite of these perceived benefits of public-private partnerships, there are many legal constraints on this financing mechanism. In addition, the contracts need to be carefully laid out so that the quality of private provision of services can be ensured and that the providers can be held accountable to the residents.

Tolls and Impact Fees

Tolls and impact fees are increasingly popular means of financing infrastructure investments because they are perceived to consistent with the user-pay or beneficiary-pay principle of taxation. It should be mentioned that users of and beneficiaries of infrastructure investment are not always the same. Therefore, the beneficiary pays principle of taxation may result in not only users, but also others contributing to the cost of constructing, operating and maintaining infrastructure systems. For example, the Bay Area Rapid Transit (BART) system in the San Francisco bay area is funded 50 percent from tolls and 50 percent from a regional sales tax. The argument is that all businesses within the BART area benefit from improved transportation systems in two ways –first it increases the size of the market and second it increases the size of the labor pool from which businesses can recruit works. Both types of benefits accrue to businesses in the area because of reduced transportation time and costs.

Toll roads or bridges are not new to the transportation system. Toll collecting is often viewed as the purest form of user-related revenue as the user is directly charged for the serviced used (Morris 2001). States may create an independent toll authority or commission through legislation. The responsibility of operation and maintenance of toll facilities will then like outside the state transportation department. Backed by computer and wireless technology, electronic toll collection increases efficiency and traffic flow (Morris 2001). There is also opposition to greater reliance on tolls for financing transportation because it makes transportation more costly and more exclusive.

Impact fees have become increasingly common in localities. They are imposed to compensate for the additional public sector costs that a new house imposes on the community, such as increased use of roads, parks, and other neighborhood amenities (Cox, Utt, and Corcoran. 2003a). Given the ease of collection, impact fees can be an effective supplement to debt financing infrastructure projects. On the other hand however, impact fees raise considerable equity issues (Tischler 1996). Lack of a uniform and well-developed assessment of impacts, the costs associated with new households tend to be overestimated (Smith 2005). Even relatively

equitable impact fees may add to the price of a new house and reduce affordability (Cox, Utt, and Corcoran. 2003a).

5. A Review of the Literature on Best Practices for Priority Setting

The provision of public infrastructure is a critical function of state and local government and managing their capital stock is a large part of what cities and states do. Water supply and distribution, sewerage, solid waste disposal, and transportation networks are the "vital systems" of modern cities and a core component of a healthy economy (NAE 1988). Together with "point" or "at place" public facilities—schools, parks, fire and police stations, and other government buildings and installations--they provide "a foundation for economic growth . . . an element of capital formation . . . [and reduce the] costs of production for firms, thereby contributing to private capital formation" (Pagano & Moore, 1985:6).

Deciding what to build, how, where, and when to build, maintain, repair, modernize, and replace infrastructure and how to finance it is the preoccupation of countless planners, engineers, public officials, consultants, contractors, bankers, and builders. No other activity of government more thoroughly entwines the interests and energies of the public and private sectors. A sound process for setting priorities for infrastructure investment would seem essential. Priority setting is complicated, however, because decisions must encompass political, economic, and technical judgments. While there is general agreement among public works professionals and managers on technical criteria or guidelines for prioritizing capital improvements, financial managers, elected officials, and interest groups often operate from different perspectives.

Efforts at reconciling these interests and perspectives and incorporating them into a systematic procedure for ranking expenditures are relatively new. In his seminal 1940 article, "The Lack of a Budgetary Theory," V.O. Key famously asked: "On what basis shall it be decided to allocate x dollars to activity A instead of activity B?" (Key, 1940:1137) He cited with approval the assertion of the National Resources Planning Board (NRPB) that the development of methods by which public officials chose where to allocate scarce resources for the greatest utility or return was "the central problem of the productive state" (Key 1940: 1140).

The NRPB reports, published in the mid-1930s, were concerned more with how to determine the aggregate amount that should be spent. The most impressive example of the consideration of alternatives for expenditures was provided by NRPB's Water Resources Committee, which developed procedures to "consider alternatives in objectives and sequences of expenditures" (Key 1940: 1139). And Russell V. Black, a city planner at NRPB, formulated a "suggestive but tentative set of criteria for the selection and programming of public works projects" (Key 1940:1138).

In the post World War II period, local and state governments were confronted with a backlog of infrastructure needs that had been postponed during the war. This was also a period or proliferating local governments and special purpose districts, created specifically to provide infrastructure. As new governments had to build systems from scratch and special districts had only a single function to perform, systematic priority setting was not a high priority. Moreover, the proliferation of federal programs to fund infrastructure was often a *de facto* priority setting system. The combination of federal funds and rapid suburbanization placed a heavy emphasis on construction of new facilities rather than revitalization and maintenance the existing stock (Tarr

1984), much of which did not meet the new design standards for facilities, produced by federal agencies, the Transportation Research Board of the National Research Council, and professional associations of public works professionals. These design and engineering standards set new parameters for determining "need," and their application to the nation's capital stock, combined with increasing costs for construction and maintenance of facilities generated growing concern, as well as some hyperbole (Choate and Walter, 1981) about the condition of public infrastructure, culminating in a congressionally commissioned, report on the condition of the nation's infrastructure (NCPWI 1988).

Development and Use of Criteria for Public Works Managers

Rising costs for materials and construction, some impressive facility failures, and new design and performance standards, and the influence of professional societies focused attention on how to assess the need for each category of facilities as essential in setting priorities. An impressive attempt to codify the experience of governments in setting priorities for infrastructure financing was undertaken by the Urban Institute in the early 1980s in a series of reports designed to assist urban governments cope with the widely perceived crisis. In the fifth of a six-volume series, *Guide to Setting Priorities for Capital Investment* Hatry et al (1984) examined the processes and criteria used by state and local government public works managers to select projects for inclusion in the capital budget. The *Guide* compiled best practices from a selection of state and local governments and provided specific steps for public officials to take in the priority setting process for investment in infrastructure. Although its focus was on maintenance, replacement and rehabilitation of existing facilities, the findings and recommendations of the Urban Institute's *Guide* are applicable to growth and expansion projects.

In an ideal world, its authors write, the same set of comprehensive criteria would be used to evaluate and rank all proposed capital projects, regardless type. Moreover, "complete, valid information would be provided on each criterion for each project," and finally, "the information on the diverse criteria could be readily combined to provide a clear picture of each project's value and a clear order of the priority among them" (Hatry et al 1984:5). In the real world, however, these conditions do not exist as there are "inherent difficulties in comparing diverse projects that ultimately compete for the same limited funds . . . [and the] . . . scope and quality of the information generated by operating agencies on individual projects are likely to be very limited and to differ widely among agencies" (Hatry et al 1984:5). The *Guide* lays out the technical issues involved in the priority setting process, including the steps in technical review process, the evaluation criteria that should be used to assess proposals, several issues with information, how to consider alternative approaches to maintenance, proposals with different funding sources, and the problem of determining the overall size of the capital budget.

Most relevant to the priority setting process are the *Guide's* criteria for evaluating infrastructure needs. These include:

- Fiscal impacts (on costs and revenues)
- Health and safety effects
- Community economic effects
- Environmental, aesthetic, and social effects
- Amount of disruption and inconvenience caused by the project

- Distributional effects – who is affected and how
- Feasibility, including public support and project readiness
- Implications of deferring the project
- Amount of uncertainty and risk
- Effects on inter-jurisdictional relationships
- Advantages accruing from relationship to other capital projects (Hatry et al 1984: 9).

While the authors note that some of these criteria are highly subjective, the list basically facilitates the use of cost-benefit analysis to determine the highest ranked projects. This systematic approach offers a starting point for governments to use but does not take into account factors such as politics. They point out that politicians generally want to have some input into the priority-setting process and report a general sentiment among politicians that they do not want technical staff "co-opting their political options by second-guessing them on political considerations" (Hatry et al 1984:36).

They suggest several guidelines for incorporating political considerations into the priority-setting process: (1) There should be some criteria that involve political implications as part of the technical evaluation; (2) various parties should use the technical information in proposals to justify capital decisions after selection has been made, this can include marketing the project by providing evidence of its cost reduction aspects to the citizens and the media; (3) keep political considerations as separate as possible from the more objective and technical information; and finally, (4) elected officials should involve citizen and business leaders in the capital priority setting process strictly to supplement the internal proposal review and provide support after choices have been made (Hatry et al 1984:36-37).

Two decades later, the International City Management Association (ICMA) updated the Urban Institute's advice in *Capital Budgeting and Finance: A Guide for Local Governments* (Vogt 2004). Designed to help local governments manage their capital budgets, it provides a how-to manual for capital planning and financing. It offers an explanation of capital budgeting approaches and methods, and presents a synthesis of accepted and successful policies, practices, and procedures from around the country.

The ICMA *Guide* notes that prioritization of capital projects takes place in an environment where needs always exceed available funding. Thus, governments must make decisions on what to fund and in what order. As some projects are approved and funded; some can be placed in the multi-year capital improvement program (CIP) for planning, design, and construction in future years as funding becomes available; some can be excluded with the intention of reassessing them down the road; and some can be turned down altogether.

It reviews six approaches that local governments use when prioritizing capital requests:

- Experience-based judgment
- Departmental or functional priorities
- Broad categories of need
- Urgency-of-need criteria
- Weighted rating of urgency-of-need and related criteria
- Program priorities, goals, and service needs assessment and planning.

Notwithstanding two decades of research on condition and risk assessment, and the introduction of new technologies that facilitate inspections of facilities, John Vogt, the *Guide's* author, reported that experience-based judgment of local officials remains perhaps the most significant factor in setting priorities in capital budgeting. These include managers, service professionals, budget and finance staff, governing board members, other officials, or citizens and others. While ranking projects using experience-based judgment is a "fundamentally intuitive approach to setting priorities," it is probably the most commonly used technique used by small and medium-sized local governments. In these jurisdictions, officials and decision-makers play a more hands-on role and are more in touch with the needs of the citizens, clients, and providers in their jurisdictions. Even with small jurisdictions, however, using experience-based judgment as the primary means of setting capital priorities does not work well when there are large numbers of projects. It tends to be inadequate where projects are technologically complex and when many decision makers are involved, because as the number of people increases, the likelihood of agreement on priorities decreases. Finally, simply using experience-based judgment to set priorities poses difficulties when there is a need to justify decisions to others, such the agencies whose requests were denied or given low priority, other officials not involved in the decisions, the media, and the public (Vogt 2004).

Because of these reasons and the high costs involved in capital budgeting, Vogt notes that many local government officials "refer to decision criteria and use organized approaches to prioritize capital project requests" (Vogt 2004:91). A common approach is to first require each department to rank its departmental priorities, using pre-established criteria or its own system. It can help officials responsible for the capital budget to know what each department considers its highest priorities, especially when they are confronted with more requests than they feel they can fund. A department head's priorities, however, may not always coincide with the general manager's or other top officials' priorities for that department. In such cases, the officials with a broader view of the jurisdiction's needs may reorder the requests of individual departments as well as make tradeoffs among departmental requests.

But in setting priorities for the jurisdiction as a whole, Vogt reports that many governments still revert to variations of experienced-based judgments. A slightly more sophisticated version classifies projects as of high, medium and low priority. Disagreements among officials on rank order can be resolved by using an ordinal or numeric scale, which allows averaging or other numeric summaries of individual assessments. In assigning a value to a project, of course, involves the use by each participant of unarticulated criteria, which may range from cost to perceived effect on some constituency or clientele.

A growing number of local governments employ specific criteria in their systems for ranking capital requests instead of simple categories or judgmental rankings. One way to specify criteria is by using urgency-of-need criteria. Some of the following are used by local governments:

- Meets legal mandates
- Removes or reduces hazards
- Advances the governing board's goals or objectives
- Improves efficiency
- Maintains standard of service
- Supports economic development
- Improves service

- Facilitates new services
- Improves quality of life or other aesthetic values
- Offers convenience (Vogt 2004).

These rankings are in rough order of importance, and some projects will meet multiple urgency-of-need criteria. Local governments that use these criteria often use them as general guidelines rather than a determinative list. Local governments also look at affordability of the project when evaluating urgency-of-need. In such considerations, source of funding may be a significant factor. Projects that are heavily funded by intergovernmental transfer payments or revenue bonds may be favored over those that will require a tax increase to support debt service for general obligation bonds.

Some governments may weight the criteria differently depending on the urgency of some projects. This is more difficult when there are a higher number of criteria, and some officials deal with this by assigning numeric weights or maximum values. These ratings can then be compiled into a total score, which is then used to rank the project. Many of these ranking systems contain several urgency-of-need criteria, and most local governments use more than six criteria. It is often the case that budget, planning, and finance staff design the criteria and ranking system to be used, and then the city or county manager approves it for use in evaluating capital projects (Vogt 2004).

While weighted ranking systems are useful for officials in evaluating requests, they have limitations. For example, asking decision-makers to fill out a questionnaire ranking all projects can take a considerable amount of time, which may be wasted if the results are not used in making decisions. Priorities may be so clear that the ranking system is unnecessary, and it is possible that the ranking system omitted or failed to weight relevant factors appropriately. Ranking systems may also become less useful if they are not revised to respond to newly emerging needs, or if political considerations override the non-political criteria that were originally used (Vogt 2004).

Some local governments set priorities by ranking capital projects "solely or mainly on the basis of program priorities, program goals and policies, and /or long-term program or service needs assessment and planning" (Vogt 2004:111). This type of needs assessment can be based on goals that are set based on a long-term needs assessment or goals that are specific to a certain project. It can also incorporate program priorities, goals, and policies of the governing board.

Policies, Plans, and Priorities

Both the Urban Institute's and ICMA's *Guides* are "bottom-up" approaches to priority setting, written primarily for urban public works professionals. Both *Guides* tend the role of central management and financial officers, elected officials, and the broader public as externalities of the priority setting process. Hatry et al devoted only a few pages to them. But they tend to be the critical actors in addressing the three functions Pagano and Moore ascribe to urban infrastructure. To the extent that they focus on measuring needs based on the standards set by the professional societies and technical agencies, they may exaggerate needs and continue the

bias toward new costly construction over more cost-effective maintenance programs and management systems designed to extend the useful life of facilities.

O'Day and Neumann (1984) addressed the broader question of "Assessing Infrastructure Needs: The State of the Art," in a paper presented at the National Research Council's 1983 Symposium on the Adequacy and Maintenance of Urban Public Facilities. They identified critical steps in developing investment needs estimates as a prerequisite to prioritizing them:

- Develop facility inventory;
- Establish performance criteria and conduct a conditions assessment;
- Identify deficiencies;
- Develop funding scenarios and program priorities;
- Develop and evaluate alternative projects;
- Evaluate program/project alternatives; and
- Select a program option.

In assessing needs, O'Day and Neumann argued that a broader framework is necessary in order to make decisions about the appropriate level of investment by placing those decisions in the broader context of the specific pattern of facility improvements to be funded. While reaffirming that the priority setting process is a key issue for governments, they and those discussing their paper at the NRC symposium stressed that reevaluation of agencies' processes must be made to ensure that the best and most effective allocations of resources are being made. This entails consideration of alternatives, including assessments of whether all old infrastructure needs to be brought to current standards, and whether some deteriorated facilities should be replaced at all, and the use of risk assessment and cost-benefit analysis. It also involves linking infrastructure priorities to the comprehensive land use and strategic plans of the jurisdiction, as these provide guidance for the role of infrastructure in economic growth and private capital formation.

Linking Capital Planning to Strategic Planning and Budgeting

O'Day and Neumann's stress on linking priority setting to a broader planning framework is reiterated and expanded upon in recent articles by Carol Ebdon (2001) and David Dowall (2004) who stress the importance of linking capital planning to the broader strategic plan and the overall budget. Carol Ebdon uses the results of the 2001 Government Performance Project (GPP) grades to describe and assess county capital management systems. She notes that while the "manner in which governments plan for future needs and manage their capital assets is crucial to maximizing their resources," . . . "we have little knowledge in a systematic, empirical manner how this is done" (192). In her brief review of the literature on capital planning, she mentions both that recent work stresses the importance of linking capital planning to the governmental strategic plan, and that formal ranking systems "aid in evaluating and comparing projects to improve objectivity in decision making" (Ebdon 2001:193). Dowall outlines ways that state-provided infrastructure could be made more efficient, cost-effective, and demand responsive. He suggests that governments could move from infrastructure provision to infrastructure management, which includes shifting infrastructure responsibilities from the public to private sector and the use of various financing techniques. He notes that there is no single

recommended approach for determining specific levels of infrastructure provision, but that "policymakers need to assess conditions carefully and proceed with reforms that are most likely to succeed in improving the quality and efficacy of infrastructure services" (Dowall 2004:8).

While Dowall primarily discusses ways that states can attempt to arrange infrastructure responsibilities as well as finance them, he highlights the need for assessing and prioritizing projects using modern methods of capital budgeting and investment planning. An important way to link planning with budgeting is through performance budgeting, which "is central to any initiative to improve the effectiveness and efficiency of infrastructure service provision. This allows funding decisions to be based on results. . . . Far too often, capital budget requests are based on wish lists and are not linked with mission statements about what the agency is trying to do or deliver." (Dowall 2004: 15) Further, it is imperative that future projections give full weight to operating and maintenance costs, or these items will be under-budgeted.

Connecting Priorities to Public Purpose

The Government Accountability Office's (GAO) special report in 1998 sought to "identify organizational attributes that are important to the capital decision-making process as a whole, as well as capital decision-making principles and practices used by outstanding state and local governments and private sector organizations."

Based on its extensive review of these governments and organizations, GAO identified organizational attributes for capital decision-making as a whole, and principals and practices for capital decision-making that are used by the selected outstanding organizations. The four critical success factors include: vision, strategic planning, the availability of good information, and communication.

GAO further distilled five general principles that leading organizations used for capital decision-making:

- Integrate organizational goals into the capital decision-making process;
- Evaluate and select capital assets using an investment approach;
- Balance budgetary control and managerial flexibility when funding capital projects;
- Use project management techniques to optimize project success; and
- Evaluate results and incorporate lessons learned into the decision making process (GAO 1998:17)

In order to provide examples of how these principles can be used, GAO provides identified best practices for each principle.

> Principle 1: Integrate organizational goals into the capital decision-making process
> Practices:
> "Conduct comprehensive assessment of needs to meet results-oriented goals and objectives
> Identify current capabilities, including the use of an inventory of assets and their condition, and determine if there is a gap between current and needed capabilities

Decide how best to meet the gap by identifying and evaluating alternative approaches (including non-capital approaches)" (GAO 1998:19)

Principle 2: Evaluate and select capital assets using an investment approach
Practices:
"Establish review and approval framework supported by analyses
Rank and select projects based on established criteria
Develop a long-term capital plan that defines capital asset decisions"

Principle 3: Balance budgetary control and managerial flexibility when funding capital projects
Practices:
"Budget for projects in useful segments
Consider innovative approaches to full up-front funding"

Principle 4: Use project management techniques to optimize project success
Practices:
"Monitor project performance and establish incentives for accountability
Use cross-functional teams to plan for and manage projects"

Principle 5: Evaluate results and incorporate lessons learned into the decision making process
Practices:
"Evaluate results to determine if organization wide goals have been met
Evaluate the decision-making process; reappraise and update to ensure that goals are met" (GAO 1998:19)

In a more comprehensive approach than the GAO, Lemer (1999) addressed the higher order aspects of infrastructure's role in economic growth and capital formation. He points out that: "Taken together, the facilities of infrastructure are among civilization's most important assets as a storehouse or resources and wealth that each generation inherits, uses, and passes on to succeeding generations" (Lemer 1999:255). Based on research conducted in cooperation with the city of Indianapolis, Lemer proposes a prototypical five-stage Integrated Infrastructure Management System (IIMS) for local governments. Its objective is to enable a local government to "achieve maximum total return on the public's assets, which is a rather bold and not universally accepted assertion" (Lemer 1999:256). These returns include non-monetary benefits, such as environmental and social components for which there are no easily determined market values.

Lemer's IIMS includes (1) data collection and analysis—which has been greatly advanced during recent years with new technologies for assessing conditions and storing and reporting information; (2) performance modeling—including deterioration and demand forecasting, impacts assessment, and technology forecasting; (3) management alternatives and scenario generation—including renewal engineering, capital investment strategy, financial strategy, and institutional development; (4) decision analysis—benefit:cost analysis, optimization techniques, risk management, planning and programming, and budgeting systems; and

management and information reporting—balance sheets, performance reports, service and accomplishments, and budgets. The virtue of his approach is that it is comprehensive, and includes each successively higher order of decision-making. Whereas the approach of the *Guides* to priority setting focuses at the operational level, this approach takes into account the budgetary and financial, general management and political, and the broader political economy levels at which priorities must be set and different perspective reconciled.

Priorities and Politics

Very little can be found in the management or financial literature concerning the role of the ultimate priority-setters, the elected officials that decide which projects to include in the capital budget or submit to voters in a bond referendum. The presumption in most of the infrastructure literature is that they are simply another level of decision that will use the information generated by the rational analyses generated at operating and budgetary levels to cap the process of rational priority setting. A refreshing exception to so benign a view can be found in Sanders (1984) essay on Politics and Urban Public Facilities. Sanders observed that: "The link between political gain and the development of urban infrastructure has been a continuing feature of American history. Our cities have largely been shaped by the needs and desires of local officials" (Sanders 1984:143-144) He then proceeds to discuss the use of public works as political strategy and why many officials choose massive new projects and those that promote growth over maintenance of rehabilitation of older ones, even when the fruit of rational analysis would recommend otherwise. Sanders argues that it is as important to understand political standards as engineering standards: "The real political value of urban infrastructure improvements is to be found in their specifics—projects that benefit and are visible to a specific ward, neighborhood, or city block. . . .The political value of rebuilding a sewer or resurfacing a street thus reflects some popular interest in this sort of project and the ability of an elected official to decide who gets what"(Sanders 1984:164). He cautions that in popular governments, setting priorities involves two kinds of rational behavior.

This preliminary review of literature on priority setting for financing infrastructure suggests that there are three basic levels at which needs are determined and priorities set among them. At the operations level, a considerable body of technique has evolved to inventory facilities, assess their condition against accepted design and performance standards, and rank their importance and urgency. Here the Urban Institute and ICMA *Guides* and the GAO Report provide a catalog of useful tools, although there appears to be agreement that many governments still use some version of experience-based decision making.

At the intermediate level of comprehensive capital budgeting, systems are not as highly developed to assist general managers in reconciling needs as defined by the operators with the financial constraints they confront. O'Day and Neumann's framework for viewing infrastructure choices as investment decisions presages Lemer's integrated management system, based on Indianapolis' experience. It represents an advanced state of the art, using various economic analysis tools to make choices that are connected to the roles infrastructure plays in a city's economic growth strategy and in implementing its general land use and strategic plans. There appear to be few standards and guidelines, however, for setting priorities at the political level.

Here there is advice and hope that the analyses conducted below will be persuasive, but few standards.

6. Summary

In this initial reconnaissance, we have found that state and local spending has steadily increased for all categories of infrastructure spending. Indeed, real overall spending increased over 38 percent between 1992 and 2002. The largest category for spending increases occurred with respect to highways; state and local governments spent 42.7 percent more in 2002 than they did in 1992. Our research has, not surprisingly, found wide variations on infrastructure among the states, as well as wide variations in the percentage of infrastructure spending on the part of local governments.

The federal grant system with respect to infrastructure spending is very complicated. There are over 1,000 federal grant programs that resulted in $415 billion being given to state and local governments in 2002. Of that amount, approximately $46.3 billion was for infrastructure related programs. The overwhelming percentage of federal grant money ($32 billion or 70 percent) was designated for highway programs. The other important discovery was that overall federal infrastructure aid to state and local governments increased an astounding 77 percent – adjusted for inflation – between 1990 and 2002.

We have found a large variety of financing tools for state and local infrastructure spending. Traditional taxes and fees still play the most significant role in financing infrastructure. But politically, it has been more difficult to raise general tax revenue over the past 3 decades. State, and to a lesser extent local, governments have utilized excise taxes and user fees to fund a greater share of infrastructure spending.

But sub-national governments have also turned increasingly to intergovernmental funds, particularly with respect to highway construction and maintenance. State and local governments have also relied heavily on bonds and other borrowing to finance infrastructure spending. Those governments have used general obligation and revenue bonds.

Our review of best practices for priority setting with respect to infrastructure budgeting has led us to several conclusions. First, at the operations level state and local governments have developed techniques to assess and rank the importance of spending on infrastructure programs. There has been considerably less development of priority setting on infrastructure capital budgeting. Alas, there are no standards developed for those charged with ultimately setting infrastructure priorities – the political leaders in the state and local government.

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