
INFRASTRUCTURE FINANCING: A Guide for Local Government Managers

A Policy Issue White Paper for ICMA (International City/County Management Association) and GFOA (Government Finance Officers Association)



Prepared by

Can Chen, Ph.D.

Assistant Professor of Public Administration
Department of Public Administration
Steven J. Green School of International and Public Affairs
Florida International University
Modesto A. Maidique PCA-354B
11200 SW 8th Street, Miami, FL 33199
Phone: 305-348-8026 | cchen@fiu.edu

John R. Bartle, Ph.D.

Fellow, National Academy of Public Administration
Dean, College of Public Affairs and Community Service
Professor of Public Administration
University of Nebraska at Omaha
6001 Dodge Street, Omaha, NE 68182
Phone: 402-554-3989 | jbartle@unomaha.edu

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A Policy Issue White Paper Prepared on behalf of the ICMA Governmental Affairs and Policy Committee, January 2017
Can Chen, Florida International University, and John R. Bartle, University of Nebraska at Omaha

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INFRASTRUCTURE FINANCING: A Guide for Local Government Managers

EXECUTIVE SUMMARY

U.S. local governments play a key role in funding, operating, and maintaining local roads, bridges, airports, transit facilities, drinking water and sewer systems, and other types of infrastructure. However, as is widely publicized, local governments across the United States are facing a serious infrastructure deficit and are exploring new ways to finance needed expansions, upgrades, and repairs. More than half of U.S. city mayors highlighted infrastructure issues during their State of the City speeches in 2015 (National League of Cities 2015). According to a new survey sponsored by the U.S. Conference of Mayors (2016), aging and underfunded infrastructure is the greatest challenge confronting mayors. Eroding infrastructure threatens citizens' safety and quality of life.

Meeting the infrastructure financing challenge has emerged as one of the most urgent issues facing the country. To bridge the financing gaps, local governments have turned to creative ways of financing public infrastructure investments. This is the context in which we

1. describe the full range of local infrastructure financing mechanisms currently in use
2. document recent innovations in local infrastructure financing
3. illustrate cases where local governments have explored alternative methods of infrastructure financing
4. offer recommendations for local government managers who are considering the use of alternative infrastructure financing options.

The examples and observations presented in this paper are based on a comprehensive review of the academic literature on infrastructure financing, a survey of current practice in local infrastructure financing, and detailed case analysis and interviews with municipalities that have instructive experiences with alternative infrastructure financing mechanisms.

Our main findings are:

- In 2012, local government spent \$339 billion on infrastructure. This infrastructure spending amount is below the historic spending level of 1992. 2012 infrastructure spending accounted for 20% of total local government expenditures, the lowest percentage in more than 50 years.
- Electric power, highways, water supply, sewerage, and transit are the top five infrastructure spending categories.
- According to responses to a 2016 ICMA survey of local governments, nearly 42% of respondents believe that the current state of the jurisdiction's infrastructure needs additional local, state, and/or federal funding to sustain even baseline maintenance, and the current state of local infrastructure adversely affects the community's quality of life. In contrast, only 13% of local government respondents believe that the current state of the jurisdiction's infrastructure meets the community's needs and an adequate level of funding is available to maintain and developed the assets. In addition, 45% of respondents contend that local infrastructure improvements could be made and additional infrastructure funding is preferred.
- Alternative infrastructure financing employs various strategies that supplement traditional sources and methods of infrastructure financing. We describe three types of alternative infrastructure financing:
 - new funding sources that generate resources for infrastructure projects
 - new financing mechanisms that offer flexible and potentially cost-effective ways of financing infrastructure, such as new credit assistance tools (loans, loan guarantees, and lines of credit) and alternative debt financing tools
 - new financial arrangements that involve new partners (the private sector, the nonprofit sector, or the general public) to participate in infrastructure financing and project delivery.

Several examples of each of these are presented in this document.

- Local governments are using a combination of traditional and alternative approaches to finance their public infrastructure investments. Alternative sources have the potential to effectively complement traditional sources to provide improvements in infrastructure that enhance social value, leverage new resources, and complete projects on a timelier basis.
- We have organized this white paper with the intent of helping local government practitioners better understand a variety of alternative infrastructure financing mechanisms and in what context they might be applied. The paper offers practical suggestions and lessons learned for local government managers who are seriously considering the adoption and implementation of innovative financing mechanisms, along with identification of potential risks.

GFOA and ICMA stress the importance of the primary way our nation pays for infrastructure. Tax-exempt bonds are the primary financing mechanism for state and local infrastructure projects—they have been used for more than 100 years and provide essential funding for states, counties and localities. Three-quarters of all public infrastructure projects in the U.S. are built by states and localities, and tax-exempt bonds are the primary financing tool utilized to satisfy these infrastructure needs. If the tax exemption is eliminated or reduced, states and localities will pay more to finance projects, leading to fewer projects and fewer jobs, or project costs will be transferred to local tax and rate payers. None of the alternative financing methods presented in this paper should be construed as a replacement, in part or in sum, to the the municipal bond as the primary financing method for public infrastructure.

INTRODUCTION: Trends and Challenges of Local Infrastructure Financing

Definition and Scope of Infrastructure

Infrastructure is the foundation of modern economies and societies. A robust, efficient, and well-maintained infrastructure system is critical to support and sustain the nation’s economy, improve quality of life, and strengthen global competitiveness. In general, there is no standard or agreed-upon definition of infrastructure according to the current usage of the term. Two approaches to define infrastructure exist in the literature. One approach is a narrow definition and refers to infrastructure as economic physical assets to support private business development. For example, the 2016 *Economic Report of the President* defines infrastructure as “fixed capital assets that are consumed jointly in various production processes that facilitate and support economic activities” (U.S.

Council of Economic Advisers 2016, p. 252). Under this definition, infrastructure consists of economic infrastructure, which comprises roads, bridges, tunnels, airports, transit, ports, railways, energy production facilities and distribution networks, telecommunication systems, water and sewer systems, and solid waste management (see Table 1).

Another approach is a broader definition that regards infrastructure as a wide array of physical assets required to support both private economic activity and social services (U.S. Congressional Budget Office 2008; U.S. Congressional Budget Office and Joint Committee on Taxation 2009). According to this definition, infrastructure not only contains economic infrastructure but also encompasses social infrastructure that is essential for a society to function. Social infrastructure includes schools, universities, hospitals, courts, prisons, parks and recreational facilities, libraries, community housing, public safety building and facilities, city halls and facilities, and the like (see Table 1).

Table 1 Types and Components of Infrastructure

Economic Infrastructure	Social Infrastructure
Transportation Sector <ul style="list-style-type: none"> • Surface (e.g., roads, bridges, railroads, parking) • Public transit (e.g., urban rail, bus rapid transit) • Aviation (airports, navigation aid systems) • Water transportation (e.g., inland and sea ports) 	Education Sector <ul style="list-style-type: none"> • Elementary schools and facilities • University buildings and facilities
Environmental Sector <ul style="list-style-type: none"> • Water supply and treatment (drinking) • Wastewater treatment (sewerage) • Solid waste management • Pollution control facilities 	Public Health <ul style="list-style-type: none"> • Healthcare facilities • Hospitals
Utility Sector <ul style="list-style-type: none"> • Electric power systems • Gas supply 	Judicial and Correctional Facilities <ul style="list-style-type: none"> • Prisons and jails • Court houses
Telecommunication Sector <ul style="list-style-type: none"> • Telephone lines and networks • High-speed Internet 	Housing and Community Development
	Government Buildings and Facilities <ul style="list-style-type: none"> • Government administration buildings • Public safety and welfare facilities
	Civic and Cultural Buildings <ul style="list-style-type: none"> • Libraries, convention centers, others • Parks and recreation

Infrastructure projects have two key features that make the financing of them fundamentally different than daily operations of governments. The first feature is large, up-front investments that require significant capital outlay. The second feature is the long economic life of the infrastructure assets. Due to the large capital outlay and the long time horizon, infrastructure projects often involve high risks—making efficient and prudent financing of infrastructure critical.

Governmental Role in the Provision of Infrastructure

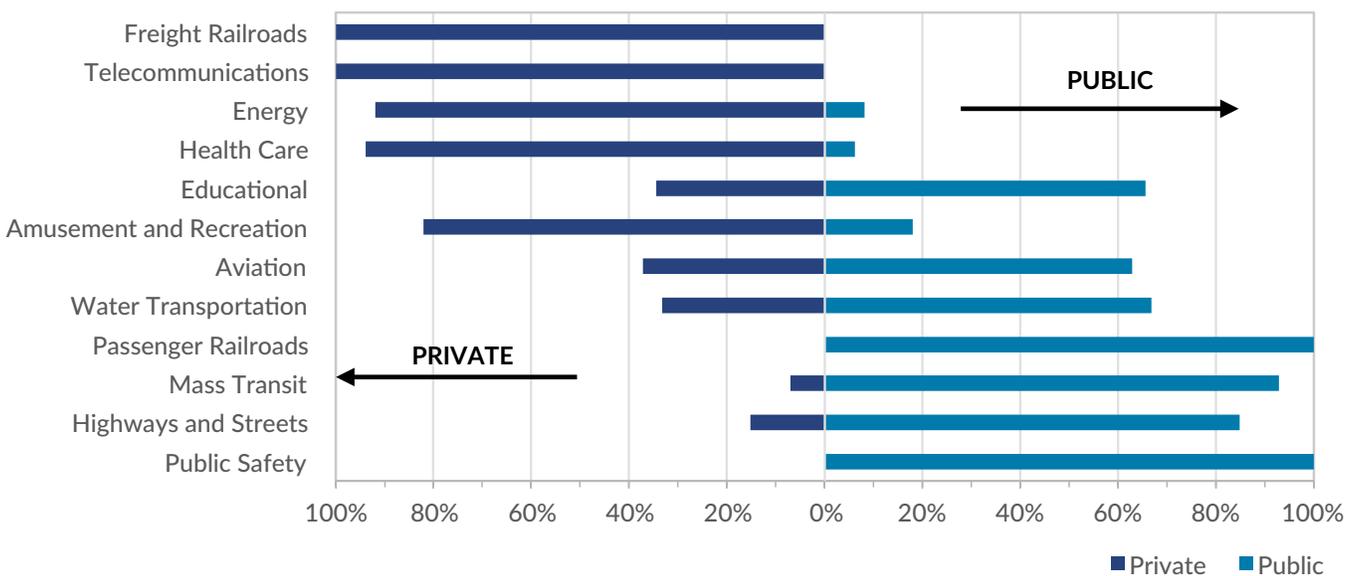
The traditional rationale for the public provision and regulation of infrastructure is built upon the economic concepts of public goods and market failure. Infrastructure assets often produce public goods that are nonrivalrous in consumption, nonexcludable in use, or both; typically exhibit natural monopoly; and often yield positive spillovers that are hard to monetize (Weimer and Vining 2011).¹ Due to these characteristics, private markets will underprovide the socially desirable levels of infrastructure. This provides a rationale for public provision. In addition, governments may also provide infrastructure for other reasons, such as equity considerations.

Figure 1 shows the varying roles of the public and private sectors in the provision of different kinds of infrastructure assets in 2014. The public

sector is the sole source of infrastructure investment for passenger railroads² and public safety. It accounts for over three-quarters of infrastructure investment on mass transit and highways and streets. The public sector also supplies over half of infrastructure investment in educational facilities and buildings, aviation, and water transportation. In contrast, the private sector provides all investment in freight railroads and telecommunications and funds most of the investment in energy, health care facilities and hospitals, and amusement parks and recreational facilities.

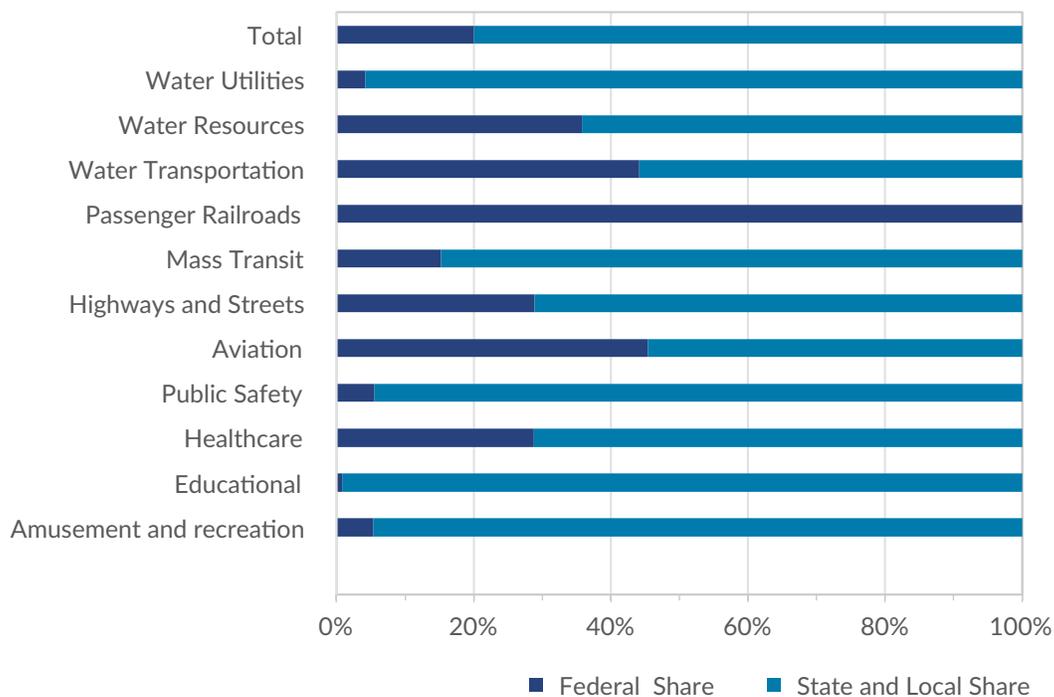
In the United States, infrastructure financing is a shared responsibility across different levels of government. As indicated in Figure 2, state and local governments are the main provider and operator of core economic infrastructure; they fund the vast majority of the nation’s roads, highways, transit systems, drinking water, and wastewater systems. In addition, they play a dominant role in funding several social infrastructure sectors such as public safety, educational facilities and buildings, health care, and amusement and recreation. The federal government is solely responsible for passenger railroads and accounts for a relatively large role (over one-third) in funding aviation, water transportation, and water resources (e.g., dams, levees, reservoirs).

Figure 1 Public and Private Share of Investment in Infrastructure, 2014



Source: U.S. Bureau of Economic Analysis (2015).

Figure 2 Share of Infrastructure Investment by Levels of Government, 2014



Source: U.S. Bureau of Economic Analysis (2015).

Trends in Local Economic Public Infrastructure Financing

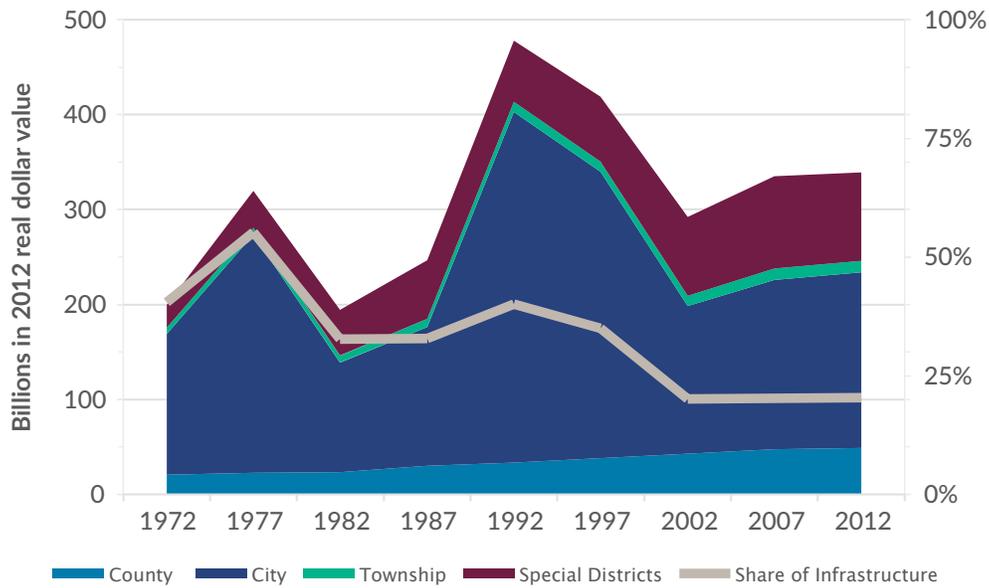
To analyze the trends of local infrastructure spending, we focused on the core economic public infrastructure (as defined earlier). Figure 3 shows the trends of local infrastructure spending by types of local government from 1972 to 2012. In 1972, local infrastructure spending was about \$200 billion (in real 2012 dollars). Then, local infrastructure spending rose and fell between 1977 and 1987. In 1992, local infrastructure spending peaked at \$478 billion. But local infrastructure spending fell dramatically between 1992 and 2002. There was a modest growth in local infrastructure spending from 2002 to 2012, but the amount of current infrastructure spending is still below the spending level in 1992. Looking at the share of local infrastructure spending, local governments spent nearly 40% of total expenditures on local infrastructure in 1977. This share peaked at 55% in 1977. Since then, the share of infrastructure spending by local governments has steadily declined. In 2012, local infrastructure spending accounted for 20% of total local government expenditures.

Turning to the amounts and shares of infrastructure spending by different types of local government,

cities account for the largest amount and share of local infrastructure spending. In 1972, cities spent \$148 billion on infrastructure, which represented 74% of total local infrastructure expenditures. Following the most city infrastructure spending (\$370 billion) in 1992, city spending fell to \$185 billion in 2012, which still accounted for more than half of total local infrastructure expenditures. Special districts account for the second largest amount and share of local infrastructure spending. Special districts experienced a steady growth in both the amount and share of local infrastructure spending: From \$24 billion, representing 12% of total local infrastructure expenditures in 1972 to \$93 billion, representing 24% in 2012.

In 1972, county governments spent \$20 billion on local infrastructure, which amounted to 10% of total local infrastructure spending. County infrastructure spending grew steadily from 1972 to 2012. In 2012, county governments spent \$49 billion on infrastructure, accounting for 15% of total local infrastructure expenditures. Township governments account for the smallest amount and share of local infrastructure spending: from \$7 billion in 1972 to \$12 billion in 2012. Its share remained relatively stable at around 3.5%.

Figure 3 Local Infrastructure Spending, 1972–2012 by Type of Local Government



Source: U.S. Bureau, State and Local Government Finance (select years).

Figure 4 shows the composition of local infrastructure spending from 1972 to 2012. Highways, electric power, water supply, sewerage, and transit are the top five infrastructure spending categories in terms of the amount of money spent. In 1972, local governments spent \$52 billion on highways (26%), \$36 billion on water supply (18%), \$29 billion on electric power (14%), \$28 billion on sewerage (14%), and \$21 billion on transit (11%). All the five infrastructure categories experienced a large growth from 1972 to 2012.

After 1977, the amount spent on electric power was greater than that spent on highways and became the largest infrastructure spending category. In 2012, local governments spent \$66 billion on electric power (20%), \$63 billion on highways (19%), \$61 billion on water supply (18%), \$51 billion on sewerage (15%), and \$50 billion on transit (15%). Local governments also spent relatively large amounts on solid waste management (\$22 billion in 2012) and airport (\$13 billion in 2012). The amounts of local infrastructure spending on gas supply, water transportation, and parking facilities are smaller.

Figure 5 shows the composition of local infrastructure spending by type of local government from 1972 to 2012. City and county governments account for the majority of local infrastructure spending on roads and solid waste management. Cities and special

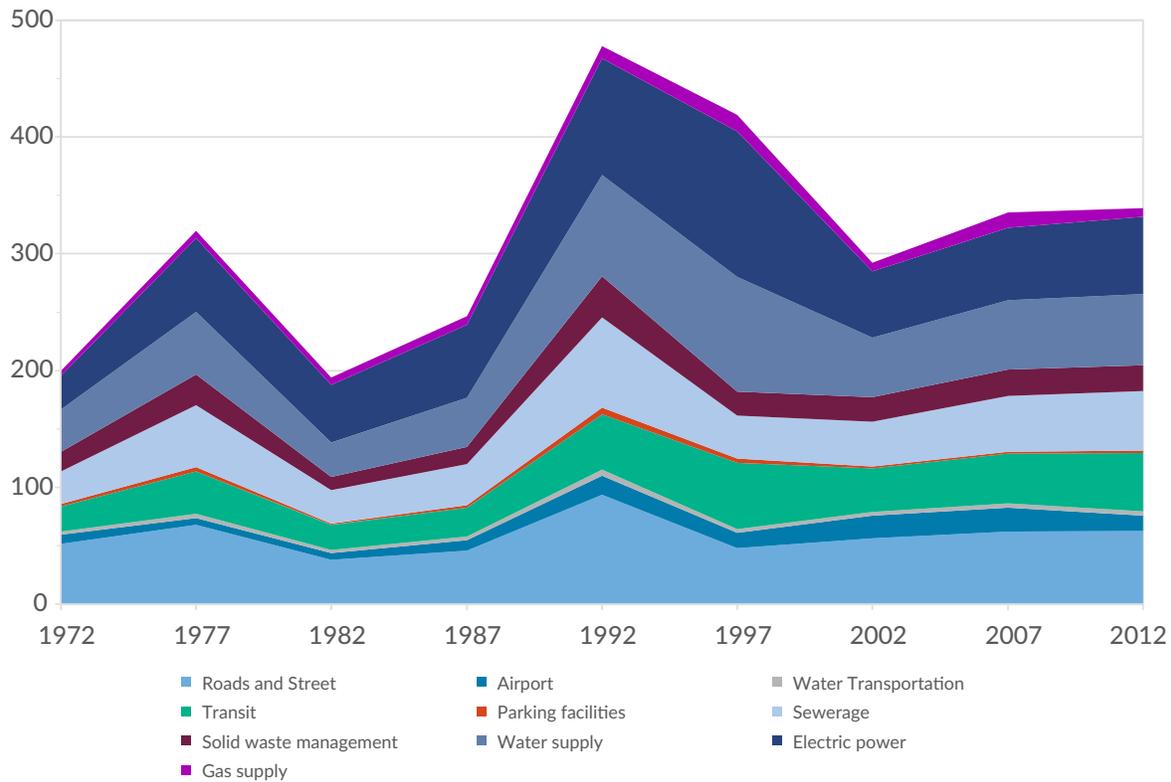
districts accounts for the majority of local infrastructure spending on airport, transit, water transportation, sewerage, water supply, electric power, and gas supply. The share of local infrastructure spending on transit and electric power has been on the rise: For transit in aggregate across the US, local infrastructure spending increased from 11% in 1972 to 15% in 2012. For electric power, it increased from 14% in 1972 to 20% in 2012. Meanwhile, the share of local infrastructure spending on airport (4%), water transportation (1%), sewerage (14%), water supply (18%), and gas supply (2%) remained stable.

In contrast, local infrastructure expenditures on roads and solid waste management have been declining: For roads, expenditures dropped from 26% in 1972 to 19% in 2012. For solid waste management, expenditures declined from 8% in 1972 to 6% in 2012.

Challenges of Financing Local Infrastructure

Local governments face significant challenges to the funding and provision of local infrastructure and service in the future. According to the initial ICMA 2016 Annual Local Government and Emerging Practices survey responses of 601 local governments, nearly 42% of local government respondents believe that the jurisdiction's infrastructure needs additional local, state, and/or federal funding to

Figure 4 Local Infrastructure Spending, 1972–2012 by Categories of Infrastructure



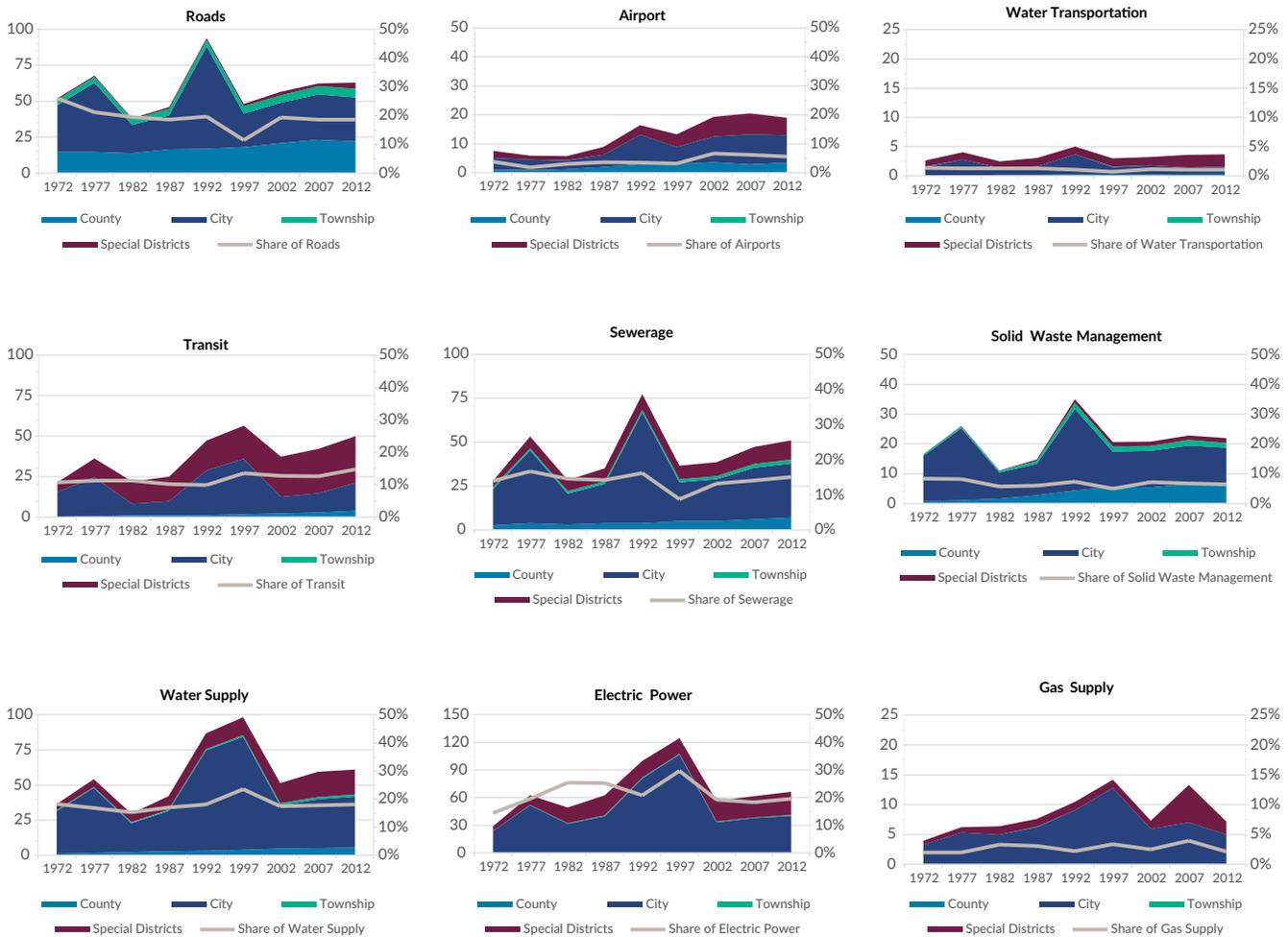
Source: U.S. Bureau, State and Local Government Finance (select years).
 Note: The y axis is billions of dollars in 2012 real dollar value.

sustain even baseline maintenance and that the current state of local infrastructure adversely affects the community’s quality of life. In contrast, only 13% of local government respondents believe that the current state of the jurisdiction’s infrastructure meets the community’s needs and an adequate level of funding is available to maintain and developed the assets. In addition, 45% of respondents contend that local infrastructure improvements could be made and additional infrastructure funding is preferred.

Many factors contribute to current challenges of infrastructure financing. On the demand side, government spending on infrastructure has not kept pace with the investment demands of population growth and urbanization (Bartle and Chen 2015). The American Society of Civil Engineers (2013) estimates that maintaining the nation’s highway systems at their current conditions will require an annual capital investment

of \$101 billion between 2008 and 2028. Moreover, an additional \$79 billion annually will be needed to improve highway conditions and performance. The U.S. Environmental Protection Agency (EPA) (2013) has identified a total capital improvement need of \$384 billion for investing in public water infrastructure systems over the next 20 years. Most of those funding needs are in localities. Consequently, cities and counties face a major investment gap in funding infrastructure projects. On the supply side, rising capital construction costs, shrinking public infrastructure funding sources, and constrained public sector budgets due to rising health care and pension costs threaten the future sustainability of local infrastructure finance. In addition, according to a new report by the National League of Cities (2016), declining and unstable federal and state funding and increasing mandates have placed increasing pressure on local governments to finance infrastructure.

Figure 5 Local Infrastructure Spending by Type of Local Government and by Categories of Infrastructure, 1972–2012



Source: U.S. Bureau, State and Local Government Finance (select years).

Note: The left side of the vertical axis is billions of dollars in 2012 real dollar value, and the right side of the vertical axis is the share of total local infrastructure spending.

Please note variations in axis ranges.

Traditional Methods of Local Infrastructure Financing

Fundamentals of Infrastructure Financing

In general, local governments rely on two methods of financing infrastructure: pay-as-you-go (pay-go, or cash) and pay-as-you-use (pay-use, or debt) (Marlowe, Rivenbark, and Vogt 2009). *Pay-go capital financing* refers to using cash or other current assets rather than debt issuance to fund capital projects. It is most commonly used in cases when capital project sizes are small, project

sponsors have limited access to debt, local governments are closely approaching their debt limits, or there are prohibitions on use of debt. *Pay-use capital financing* means issuing long-term debt in the form of general obligation bonds or revenue bonds to fund capital projects. Infrastructure projects often involve large or lumpy investments and benefit both current taxpayers and future generations. The use of debt financing is justified in part by the rationale of spreading out the costs of public infrastructure investments throughout life of the asset.

Whether the choice is pay-go or pay-use capital financing, sources for funding local infrastructure generally come from local general taxes, special funds such as dedicated user fees and earmarked taxes, intergovernmental grants, bond proceeds, or some combination of these sources. For example, local sources for funding highways primarily include federal and state highway aid, general fund appropriations, tolls, and bond proceeds. Municipal wastewater and drinking water infrastructure projects have largely been funded by local wastewater and water supply user fee charges and private market debt, with the remainder of funding from federal and state grants. Local governments have a variety of methods that provide traditional infrastructure financing, and each method has its unique strengths and weaknesses. Table 2 provides a list of these traditional financing methods and funding sources.

Traditional Infrastructure Financing Methods

Taxation

Tax revenue is commonly used in local infrastructure financing. General taxes refer to broad-based taxes on residents and business. They consist of sales tax, property tax, and local income or wage taxes and are often used to finance local infrastructure projects that yield community-wide benefits such as local streets, transit, and parks and recreation. Using general tax revenues to finance local infrastructure has the advantage of employing large tax bases and relatively stable and predictable tax revenues. However, some general taxes such as local sales tax are regressive and may impose a larger cost burden on low-

income people than on higher-income people. In addition, in many cases, increases in these general taxes are subject to voter approval. This approval process may face considerable public resistance and take longer, delaying the timely construction of needed infrastructure.

In addition to general taxes, many local governments use more narrowly-based taxes either in their general fund or in special funds and dedicate these revenues to fund local infrastructure. Local utility taxes, telecommunication taxes, gaming taxes, and hotel and other occupancy taxes are often deposited into a special revenue fund, effectively reserving the funds for that specific project. Some or all of these revenues can be earmarked for infrastructure purposes. The key advantage of earmarking special tax revenues is that earmarking protects local infrastructure projects from competition from other uses of these funds. Furthermore, some taxes such as local hotel/motel taxes largely charge nonresidents for using local infrastructure. However, disadvantages include volatility of special revenue sources, such as gaming and tourism taxes, and earmarking financing, which may restrict the flexibility and discretion of local officials in the fiscal planning.

User Charges

User charges play a crucial role in local infrastructure finance, particularly for drinking water, wastewater, and solid waste disposal. Fees are also imposed on local residents and businesses for their use of utilities and other public enterprises, including tolls, motor vehicle license and registration fees, congestion pricing, transit fares, airport terminal use fees, water charges, sewer

Table 2 Traditional Methods of Local Infrastructure Financing

Pay-As-You-Go Financing Cash and Savings	Pay-As-You-Use Financing Debt Financing
<p>Taxation</p> <ul style="list-style-type: none"> • General taxes • Special dedicated taxes <p>User charges</p> <p>Capital reserves and fund balance</p> <p>Federal grants and aid</p> <p>State grants and aid</p>	<p>Loan financing</p> <ul style="list-style-type: none"> • Private bank loans <p>Bond financing</p> <ul style="list-style-type: none"> • General obligation bonds • Revenue bonds • Private activities bonds • Leasing-revenue bonds

Source: Authors' compilation.

charges, franchise fees, parking fees, and others.

User charges are typically collected into an enterprise fund that accounts for local government business-type activities. Local infrastructure projects such as those related to water, wastewater, parking facilities, and convention centers are sometimes funded by user charges through an enterprise fund. Significant user charges such as water utility fees can be used as the dedicated revenue source to secure revenue bonds. User-charge financing is advantageous because it functions to recover partial or full costs of the consumed government services and to offer price signals and incentives to induce consumers' choices (Anderson 2012; Fisher 2007). It may be politically easier to use user charges to fund revenue-generating infrastructure projects than to use general taxes. The downsides of relying on user charges are their regressive nature and the concern about social equity for lower-income people.

Capital Reserves and Fund Balances

Local governments regularly save and accumulate money in capital reserve funds, and then designate the funds to pay for recurring and small capital projects (Bunch 2012; Marlowe et al. 2009). Capital reserves have the advantage of reducing debt issuance and preserving flexibility in future operating budgets. However, saving sufficient money takes time. During tough fiscal periods, capital reserve funds may be diverted to support operations. Moreover, the use of capital reserves is confined to less expensive capital projects.

In addition to capital reserve funds, local governments can set up a capital asset replacement fund (sinking fund) to pay for the future replacement of government buildings, equipment, facilities, vehicles, and certain other assets. A capital asset replacement fund is operated as an internal service fund that charges local government departments and agencies a service fee for the use of equipment, facilities, and vehicles (Marlowe et al. 2009). Similar to a capital reserve fund, a capital asset replacement fund may not be reliable during tough fiscal times because its revenue may be diverted into the general fund for operations. Under certain circumstances, general fund balances become a source for infrastructure financing. Under certain circumstances, general fund balances become a source for infrastructure financing. A specific portion of

them may be used to purchase major equipment or to help fund infrastructure projects (Bunch 2012).

Federal and State Grants

Federal and state grants represent a major funding source of local infrastructure financing. A variety of federal grant programs are available for helping fund local infrastructure. For example, the Fixing America's Surface Transportation Act (FAST Act) is the most recent federal transportation bill signed into law on December 4, 2015. The FAST Act extends federal highway and transit funding from fiscal year 2016 to 2020 and offers funding opportunities to help improve local transportation-related development activities and expand transportation modes.

Popular federal transportation grant programs include surface transportation block grant programs, grants for buses and bus facilities, and fixed guideway capital improvement grants. The EPA provides capitalization grants for state clean water and drinking water revolving funds, which provide low-cost loans to local communities to finance drinking water and wastewater infrastructure improvements.

Since 1974, the U.S. Department of Housing and Urban Development (HUD) has been providing the Community Development Block Grant (CDBG) program, which can be used for community development projects such as water and wastewater improvements, community/public facilities, public housing, and smaller public works projects. It should be noted that federal infrastructure grants have been less stable and predictable in recent years, which makes it harder for states and localities to do long-term capital planning. For instance, the Federal Highway Trust Fund continues to face insolvency because lawmakers failed to achieve consensus on a long-term funding solution (Pomerleau 2015). In addition, federal infrastructure-related program spending, including CDBG and EAP funding, is declining for most programs.

Besides federal grants, state-funded grants and aid programs are available in many states to help fund local streets, bridges, water supply and wastewater utilities, parks and recreation, facilities and equipment for law enforcement, and many other local infrastructure needs. For example, many state clean water and drinking water revolving funds provide grants to help smaller and rural communities improve local water and sewer infrastructure. Some states, such as Georgia and

Indiana, offer state grants and aid to help local governments make road improvements.

Federal and state grants have the advantages of sharing the cost of infrastructure projects and enabling local governments to fund needed capital projects. However, federal and state governments have their own policy goals and priorities in designing grant programs. External grantors have different priorities than local jurisdictions. Additionally, federal and state governments often impose hard restrictions on the local government recipients' use of intergovernmental grants. Last but not least, most federal and state grant aid targets helping fund local capital construction rather than helping fund maintenance. This may lead to a larger burden on local governments to set up appropriate funds to maintain infrastructure.

Debt Financing

Debt financing is the key type of long-term borrowing that localities use to raise money for building and constructing long-lived infrastructure assets. In the U.S., the municipal bond market plays a crucial role in state and local capital financing. About 90% of state and local capital spending is financed by debt (Marlowe 2015). Infrastructure projects are usually lumpy investments that benefit both current taxpayers and future generations over many years. The use of debt financing is justified by the rationale of spreading out the costs of public infrastructure investments over the period of bond repayments. In addition, local governments can immediately obtain needed capital and build capital projects without significant delay.

Typically, local government debt financing can take the form of either a private bank loan (loan financing) or a municipal bond (bond financing). Local governments can secure direct loans from private commercial banks, industrial loan companies, or industrial banks. It is estimated that bank financing of public infrastructure projects has ballooned to over \$155 billion with another \$25 to \$30 billion being added each year (Kelly 2016). Using bank loans is advantageous especially for small governments that have limited access to the municipal bond market and cannot afford the costs of bond issuance. However, compared to the use of municipal bonds, private loan financing is usually more expensive and less transparent and does not disclose information to investors to the same degree (Kelly 2016).

For more information about local government considering bank loans, GFOA's best practice "Understanding Bank Loans" provides recommendations about policies, procedures and engagement by other professionals when issuing privately placed debt.

<http://gfoa.org/understanding-bank-loans>

Instead of securing loans from private banks, local governments frequently choose to issue bonds directly to municipal capital investors (bond buyers) in order to raise the needed capital to finance the construction of new capital projects or refinance existing bonds. When issuing bonds, local governments are obligated to repay debt service (bond principal and interest payments). Because interest income from publicly-issued bonds is exempt from federal income taxes, local governments are able to obtain lower interest rates compared to corporate bonds, which significantly reduces the debt costs of issuing bonds. According to a recent report sponsored by ICMA and GFOA, local governments would have paid \$714 billion in additional interest expenses from 2000 to 2014 if the federal tax exemption for municipal bonds were repealed (Marlowe 2015).

Local governments use two general types of bond financing: general obligation bonds (GO) and revenue bonds. *GO bonds* are the long-term obligations of local governments backed by the issuer's full faith and credit, which means the issuing governments are obligated to repay bonds from their general tax revenues. GO bonds are traditionally issued to finance projects that do not yield revenues, such as public schools, libraries, public safety equipment, city halls, fire stations, and jails. GO bonds usually have better credit ratings and therefore are less costly to bond issuers than revenue bonds. However, GO bonds are subject to constitutional debt limits. In many states they require voter approval. Moreover, GO bonds impose a debt obligation on future taxpayers and limit budget flexibility in future years.

Revenue bonds, also referred to as nonguaranteed debt, are typically issued to finance public facilities that have definable users with specific revenue streams, such as utilities, toll roads and bridges, educational facilities,

and hospitals. Revenue bonds are secured by the pledge of defined revenue sources generated from the bond-funded projects (user fees, tolls, facility rent). Revenue bonds generally have more risk due to the uncertainty of generated revenues, thus the issuance of revenue bonds costs bond issuers more. However, an advantage is that most revenue bonds are not subject to constitutional debt limits and may not require a public vote.

Private activity bonds (PABs) are a type of municipal bond issued by local governments on behalf of a private business to build those projects that benefit private entities but also serve some public purpose (e.g., airport improvements, water facility upgrades, toll roads). PABs enable private users to benefit from the government's status as a tax-exempt entity and bear lower interest rates. They encourage private sector investment in infrastructure projects with qualified public benefits. However, PABs are subject to a federally imposed cap that limits the annual amount of PABs that can be issued in each state, which stands at around \$32 billion (Puentes 2012). In addition, they require significant requirements to sustain the tax-exempt status of the bonds. These include information filing and other requirements related to issuance, the proper and timely use of bond proceeds and bond-financed property, and limitations on how bond proceeds may be invested. (<https://www.irs.gov/pub/irs-pdf/p4078.pdf>)

Lease financing (lease-purchase of equipment, lease purchase debt, or certificates of participation) has become an increasingly popular bond financing tool used to finance, for example, local police vehicles, fire trucks, courthouses, and correctional facilities. A lease is a contractual arrangement between private or nonprofit equipment and facility owners or construction builders (the lessors) which transfers the use and ownership of that equipment and/or facility for a negotiated period of time to local governments (the lessees) (U.S. Office of the Comptroller of the Currency 2014). Under the lease agreement, the lessors use the regular lease payments from local government to repay debt service. Interest income on a municipal lease is tax-exempt to the lessor. At the end of the lease period, the local government often assumes ownership of the property. Lease financing has no required bond referendum and is not subject to legal debt limits. GASB Lease project in 2016 required additional reporting of lease obligations on the statement of net assets and, in some cases, may contribute to the statutory debt limits (per

NABL). Therefore, it has a greater flexibility. However, lease payments from local governments are subject to annual budgetary appropriation. Because there is not a multiple-year appropriation or dedicated revenue sources to secure lease payments, lease financing has a higher interest rate.

ALTERNATIVE MECHANISMS OF LOCAL INFRASTRUCTURE FINANCING

Definition and Types

Chen (2016a) defines innovative or alternative infrastructure financing as an umbrella concept that supplements traditional infrastructure funding sources and financing methods, and embraces any strategy involving new funding sources, new financing mechanisms, and new financial arrangements in the provision of infrastructure. Note the difference between infrastructure funding and financing: *Funding* refers to a revenue stream or money that pays for an infrastructure project (U.S. DOT 2010). It may consist of a revenue source from local tax receipts or grants, or it may refer to proceeds of debt financing. A large infrastructure project typically involves multiple sources of funding, including federal, state, and local sources. *Financing* refers to borrowing money to pay for an infrastructure project, typically through a bond, but also through loans or other debt mechanisms such as a line of credit (U.S. DOT 2010). Similar to a home mortgage, debt must be paid back over time with interest. A source of revenue must be secured to repay the debt, whether it is future federal and state grants, local taxes, or other sources.

Using Chen's definition (2016a), we categorize alternative infrastructure financing into three types (see Table 3):

- *New funding sources* are any new measures that generate additional revenue resources to pay for infrastructure projects. They include new taxes such as local option taxes that are earmarked for infrastructure projects, or different value-capture mechanisms such as impact fees or development exactions, which are charged to compensate the cost of constructing new infrastructure improvement projects during the development process.

Table 3 Typology and Categories of Alternative Infrastructure Financing

New Funding Sources	New Taxes	Local Option Sales Taxes
		Local Option Fuel Taxes
		Local Option Income and Payroll Taxes
		Local Option Vehicle Tax
	Value Capture	Impact Fees
		Special Assessment Districts
		Tax Increment Financing
		Joint Development
New Financing Mechanisms	New Credit Assistance Tools (Loan, Loan Guarantee, Lines of Credit)	Transportation Infrastructure Finance and Innovation Act (TIFIA) Loans
		Environmental State Revolving Funds: Clean Water State Revolving Funds Drinking Water State Revolving Funds
		Transportation State Revolving Funds: State Infrastructure Banks
	Alternative Bonds and Debt Financing Tools	Grant Anticipation Revenue Vehicle Bonds (GARVEEs)
		State Bond Banks
		Green Bonds
		Social Impact Bonds
	New Financial Arrangements	Public-Private Partnerships
Design-Build-Operate-Maintain		
Design-Build-Finance-Operate-Maintain		
Concession		
Privatization		Lease
Infrastructure Investment Funds		Pension Funds
		Sovereign Wealth Funds
		Private Companies (Insurance and Investment Banks)
Private and Nonprofit Philanthropic Partners		Donations
		Grants
		Program Investment
Crowdfunding		Donation-Based (Public Goods)

Source: Authors' compilation.

- *New financing mechanisms* represent new methods for borrowing money in flexible and/or potentially cost-effective ways to pay for an infrastructure project. They include new credit assistance tools (loans, loan guarantees, and lines of credit) offered by governments and alternative bond and debt financing tools (GARVEE [Grant Anticipation Revenue Vehicle] bonds, green bonds, social impact bonds).
- *New financial arrangements* involve new partners (the private sector, the nonprofit sector, or the general public) to participate in infrastructure financing and project delivery.

The next section describes each innovative infrastructure finance mechanism, highlights the strengths and weaknesses of each, and provides one or two examples.

Five New Funding Sources

1. Local Option Taxes

Description

Local option taxes are new tax options that are either authorized at the state level or approved by local voters and levied at the county or municipal level for infrastructure-related purposes (Goldman and Wachs 2003). The most common form is the local option sales tax (LOST), but some jurisdictions use local fuel taxes, local income and payroll taxes, and local vehicle taxes. Revenues from local option taxes are sometimes earmarked for building special local infrastructure projects. According to the National League of Cities (NLC), 29 states authorize local option sales taxes, 16 states authorize a local option fuel tax, and 26 states authorize local option motor vehicle registration fees (NLC 2016).

Strengths

- often transparent and democratically approved
- dedicated to specific projects with local priorities
- fairly stable and predictable revenue sources
- piggyback off of an existing tax making administration easier

Weaknesses

- often require direct voter approval
- often subject to rate limitations and spending restrictions
- may favor capital construction over regular maintenance activities

Example

- Local government reliance on local option tax revenues is increasing in 2016. For example, voters in cities including Atlanta, Charlotte, Dallas, Denver, Seattle, and St. Louis have approved the use of a local option sales tax for constructing new rail projects.

2. Impact Fees

Description

An impact fee is a one-time charge imposed on new businesses or property owners to pay for a share of the costs of new development activities (Peddle and Lewis 1996). Impact fees are widely used in many local governments to fund the provision of new public infrastructure during the development process. Impact fees must be spent for improvements that benefit those who pay the fees because the fees are held in a restricted fund. As of 2012, 27 states have authorized local government to use impact fees (development charges or exactions, capacity fees, or facility fees). In most states, impact fees are used to fund the costs associated with roads, water provision, sewer, storm water, and parks. Additionally, many local governments are also allowed to use impact fees for financing schools, libraries, and fire and police facilities.

Strengths

- help fund new development
- match payments with benefits
- often no requirement of voter approval

Weaknesses

- may have administration and assessment burden for new development
- potential impact on affordable housing
- may only partially cover total infrastructure capital costs
- may provide restriction in economic growth

Example

- In 2003, the city of Lincoln, Nebraska, started its impact fee program. More than \$34.3 million of impact fees have been collected to fund streets, water, sewer systems, and parks in the fastest growing areas of the city.

3. Special Assessment Districts (SADs)

Description

SADs are formed to include a geographic area in which property owners or businesses agree to pay a special property tax assessment to fund a proposed improvement or service from which they expect to benefit directly (Froelich and Gallo 2014). A Transportation Development District (TDD) is one typical example of special assessment districts for infrastructure purposes. TDDs are a special taxing district for the designated purpose of developing and improving transportation infrastructure and services in a designated area (Chen and Ebdon 2013). A TDD allows for financing a wide array of transportation needs in new development or redevelopment areas, such as local streets and highways, urban light rail, mass transit, or multimodal infrastructure. It can be formally established by request of local voters, property owners, or a local transportation authority.

Strengths

- match payments with benefits within a designated geographical area
- no requirement of voter approval

Weaknesses

- administration and assessment burden
- requirement of legislative approval

Example

- The city of Kansas City, Missouri, recently was authorized to create the Downtown Transportation Development District (DTDD) as the primary financial mechanism to fund the cost of a planned \$102 million streetcar line. It will collect a 1% sales tax on sales within the DTDD. The anticipated sales tax revenue will be used to back \$73.5 million in bonds. Special assessment fees will also be charged along the downtown streetcar line.

4. Tax Increment Financing (TIF)

Description

Tax increment financing (TIF) has been increasingly used to finance a wide array of infrastructure and economic development projects. It is a value-capture mechanism to capture the new or incremental taxes that are created when underutilized and vacant properties are redeveloped, and to use future captured revenues to finance the costs of infrastructure improvement such as sidewalks, sewer extensions, and roads

(Johnson and Man 2001). TIF is generally thought of as a self-financing district. As property values increase due to private sector activity spurred by the new infrastructure investment (or other incentive) with the redevelopment project, the tax increment is diverted to pay the debt incurred for the redevelopment activities. In a successful TIF scenario, until the TIF obligations are paid off, all tax revenues are collected for a designated period (usually between 15 and 30 years) and go to pay debt service on the TIF financing and not the local government taxing jurisdictions. At the end of the TIF period, revenues return to the local jurisdiction. In many cases, because incremental revenue is used to pay for debt during the TIF period, it is not used to support what are increased costs of service for the TIF district. As a result, areas outside the TIF district ultimately subsidize costs of service within the TIF district. In governments that have widely used TIF strategies, diverting TIF revenue to pay debt has placed serious constraints on property tax growth and government are not able to keep pace with increases in expenditures. When TIFs are unsuccessful, for example, when the incremental revenue is not sufficient to pay the debt, the jurisdiction is faced with a larger problem. TIF districts are primarily governed by local governments or special districts, such as community redevelopment agencies.

Strengths

- provides an incentive to develop identified areas
- attracts private sector investment that would not be possible “but for” the public subsidy
- has the potential to redevelop blighted areas in some circumstances.

Weaknesses

- significant risk if the gains in property values are below forecast and a concept that is economically driven (outside the control of the local government manager)
- restricted to redevelopment-related infrastructure activities
- costs spillover outside the TIF areas

Example

- In Nebraska, the use of TIF is restricted to a declared blighted and substandard area for a maximum of 15 years, which is a shorter time period than most states. The City of Omaha has actively used TIF to finance redevelopment over three

decades. The completed TIF projects in Omaha range from the revitalization of downtown Omaha and Midtown Crossing, to the creation of Aksarben Village, the Airport Business Park, and the Stockyards Business Park in South Omaha. As of 2012, there were over 170 TIF plans active in Omaha. In 2012, the TIF excess value was over \$1.3 billion accounting for 4.51% of the City's total taxable value. Midtown Crossing is one of many successful TIF revitalization projects in the City of Omaha. It is a mixed-use development, with restaurants, shopping, housing, and a theater. TIF excess tax levied in Midtown Omaha increased from \$46,194 in 2009 to almost \$2 million in 2012.

5. Joint Development

Description

Joint development is a formal arrangement between local governments and private developers such that private developers contribute some benefits back to local governments or jointly share costs of infrastructure improvement with local governments (Landis, Cervero, and Hall 1991). It is a value-capture mechanism commonly used by local transit agencies. For example, under the agreement of joint development, a real estate private developer may provide parking in return for development rights near a transit station. Local transit agencies may invest land in this project or directly make cash investment in a project that incorporates both public facilities (e.g., parking garages) and private development.

Strengths

- long-term and stable resource sources
- generates revenues applicable for operating expense

Weaknesses

- project risk of the development
- market risk if there is a decline in real estate values

Example

- In Miami-Dade County, Florida, a joint development project in the Dadeland North Metrorail Station was initiated in 1994. The 90-year lease with private developers started in 1994 and will expire in 2084. Under the joint development agreement, the Miami-Dade County transit agency receives either \$400,000 or 5% of gross revenues annually from the developed commercial projects around the Dadeland North Metrorail Station.

Two New Financing Mechanisms

1. New Credit Assistance Tools

1A. TIFIA Credit Assistance

The Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA) provides federal credit assistance in the form of direct loans, loan guarantees, and standby lines of credit to finance surface transportation projects of national and regional significance (U.S. DOT TIFIA website).

- Direct TIFIA loans are the loans made to state and local project sponsors with low-interest rates and flexible repayment terms. TIFIA loans have a maximum term of 35 years. Loan repayments can start up to five years after substantial completion of projects.
- Loan guarantees provide full-faith-and-credit guarantees by the federal government and guarantee a borrower's repayments to private lenders.
- Standby lines of credit represent a credit source of funding in the form of contingent federal loans that can be used to supplement project revenues.

The size of TIFIA loans cannot exceed 49% of total eligible project cost. The amount of TIFIA loan guarantee and standby lines of credit are capped at 33% of total eligible project cost. Since program inception, TIFIA has approved 61 loans totaling nearly \$23 billion to stimulate over \$82 billion of transportation infrastructure investments throughout the U.S. (US DOT 2016a).

Strengths

- lower interest rates
- flexible TIFIA repayment terms
- accelerates project construction
- reduces total project cost

Weaknesses

- requirements to apply and compete for funding
- not applicable for small projects
- subject to the authorization of federal funding
- complies with all federal laws and regulations

Example

- In 2012, the U.S. DOT awarded \$545.9 million of TIFIA loans to Los Angeles County Metropolitan Transportation Authority to help build a new light rail transit line along the Crenshaw corridor. The

total project cost is \$1.75 billion. Revenue from a voter-approved local option sales tax was devoted to paying back the TIFIA loan.

1B. Environmental State Revolving Funds (SRFs)

SRFs are state-run entities capitalized by federal funds and state matching funds that offer loans with below-market interest rates to local jurisdictions. Loan repayments revolve back into the pool of funds to fund other local eligible projects (Chen 2016a, 2016b). Currently, there are two types of environmental SRFs. Both are capitalized by EPA capitalization grants and require a minimum 20 percent match of state funds. The first type is Clean Water State Revolving Funds (CWSRFs), which provides low-cost loans to finance local eligible water quality projects. The CWSRFs program has provided approximately \$74 billion of financial assistance by issuing 24,688 low-interest loans (U.S. EPA 2010a). Another is the Drinking Water State Revolving Funds (DWSRFs) program to finance drinking water infrastructure improvements. The DWSRFs program has entered into more than 6,000 assistance agreements and offered over \$16 billion in low-interest loans to public water systems since its inception in 1997 (U.S. EPA 2010b). The loan rates in SRFs are below market. For example, in FY 2009, the weighted average CWSRF interest rate was 2.3%, compared to an average market rate of 5% (U.S. EPA 2010a).

Strengths

- low interest rate on loans
- flexible repayment terms
- stable and growing funding sources
- applicable to small communities

Weaknesses

- requirements to apply and compete for funding
- comply with all federal and state laws and regulations

Example

- In 2015, the Georgia Environmental Finance Authority (GEFA) awarded CWSRF and DWSRF water infrastructure financing loans totaling \$14 million to 11 Georgia cities and 2 local water authorities. These loans were used to help local communities build water, sewer, and wastewater infrastructure improvements.

1C. State Infrastructure Banks (SIBs)

Similar to the environmental SRFs, SIBs use seed capitalization funds from federal transportation aid and state-matching funds to get started, and offer low-interest loans and non-grant forms of credit enhancements to public and private sponsors of state and local transportation projects. Loan repayments from existing project borrowers are recycled and available for future lending. As of 2015, SIBs have provided 972 low-interest loans to state and local governments with a total loan value of \$5.8 billion (U.S. DOT 2016b).

SIBs can provide different kinds of financial assistance to project sponsors, from low-interest rate loans to credit support. The majority of SIB loan recipients benefited from lower borrowing costs compared with alternative municipal bond financing (Yusuf et al. 2010). In addition, SIBs leverage their initial equity funds to increase state and local transportation investments. Chen (2016b) finds that for every one dollar of SIB loan disbursements to state and local highway project sponsors, state and local highway capital expenditure will increase by nearly three dollars on average over a three-year period.

Finally, by lowering the financial risk, SIBs can help attract private developers wishing to take an equity interest in transportation projects. For example, the Pennsylvania Infrastructure Bank (PIB) has made many loans to local transportation projects involving private partners. However, in practice, SIBs vary widely across states in terms of program implementation. The Great Recession hurt states' capacities to provide new infusions of capital to existing SIBs. For example, since 2009, the Arizona SIB (Highway Expansion and Extension Loan Program) has stopped making new loans to localities due to the need to repay its debt obligations.

Strengths

- lower interest rates
- flexible loan repayment terms
- accelerate project construction
- attract private partners

Weaknesses

- many SIBs are inactive and underutilized
- requirements to apply and compete for funding
- compliance with all federal and state laws and regulations

Examples

- In 2015, the Ohio SIB awarded 20 loans totaling \$83.1 million to local communities for a wide array of transportation projects. Since its inception, the Ohio SIB has issued 187 loans and 7 bonds for a total of \$617.8 million.
- In 2013, Dauphin County, Pennsylvania, established the first-ever county-level infrastructure bank to make low-interest loans to municipalities and private developers for transportation improvements. In 2014, this bank awarded \$3.9 million in low-interest loans to five local infrastructure projects.

2. Alternative Bonds and Debt Financing Tools

2A. Grant Anticipation Revenue Vehicle Bonds (GARVEEs)

GARVEEs are bonds or notes issued by states and local governments with the pledge of anticipated future federal-aid highway grants (U.S. DOT 2016c). The issuance of GARVEEs enables state and local governments to obtain upfront financing and accelerate highway construction. It also leverages federal funds and increases state borrowing capacity. As of March 2016, 25 states and 3 territories have issued more than \$19.1 billion in GARVEEs (U.S. DOT 2016c). It should be noted that GARVEEs are the debt obligation of state and local governments rather than the federal obligation. Because GARVEEs are subject to federal funding authorization, they generally have more risk than municipal general bonds.

Strengths

- quickly obtain upfront financing sources
- accelerate project construction
- leverage large amounts of financing

Weaknesses

- claim on anticipated future federal funds
- subject to the authorization of federal funding
- comply with all federal laws and regulations

Example

- In 2005, the California Transit Finance Authority (CTFA) issued a \$25,475,000 GARVEE revenue bond on behalf of the Ventura County Transportation Commission to finance the Lewis Road widening project in Ventura County.

2B. State Bond Banks (SBBs)

SBBs are state-sponsored entities that assist local governments in issuing bonds for financing general infrastructure needs (Chen 2016). Currently, 10 states have established SBBs, including Vermont, Maine, Alaska, North Dakota, New Hampshire, Illinois, Indiana, Michigan, Oregon, and New York. While SBBs differ in program administrations and financing structures, most SBBs (e.g., Vermont, Maine, and Indiana) operate as independent and self-supporting entities and usually charge small administrative fees to local borrowers in order to support their daily operations.

In contrast, other SBBs are administered by state agencies and rely on state appropriations to subsidize their annual operations. SBBs can lower borrowing costs for local participating jurisdictions. Due to the diversification of the bond pools and state credit enhancements, local participants can obtain lower borrowing interest costs through SBBs than they would be able to borrow on their own. Additionally, through pooling small issues of multiple local bonds to achieve economies of scale, SBBs spread the fixed costs of bond issues across local participants, further reducing the bond issuance costs for local participants. For instance, the Maine Municipal Bond Bank (MMBB) estimates that for a \$1 million, 20-year bond issuance, local communities bear \$2,500 to \$5,000 of the issuance cost through participating in bond banks, which is an up-front savings of as much as \$33,300 (Council of Development Finance Agencies website). And finally, in addition to reducing the costs of borrowing, SBBs simplify the bond issuance process for local participants and provide financial and administrative expertise and advice to local entities regarding the complexities of debt issuance.

Strengths

- lower borrowing costs
- simplify the bond issuance process
- provide financial and administrative expertise and advice

Weaknesses

- issue bonds in moderate amounts
- relatively inflexible due to the deadline for program application and the fixed schedule of the pooled debt issuance
- retain more state control over local bond issuance process

Example

- During 2015, Alaska Municipal Bond Bank Authority (AMBB) issued bonds totaling \$175.6 million. It made \$81.9 million in loans to local communities for new capital projects. Over the last decade, AMBB has saved Alaskan local communities more than \$110 million, and has secured over \$1.6 billion since its inception in 1975.

2C. Green Bonds (GBs)

GBs, which are an extremely new type of investment financing vehicle in the market, and largely unproven, are regular bonds but issued to finance specific “green” projects that have significant environmental benefits such as renewable energy, energy efficiency, sustainable waste management, sustainable forestry and land use, and other projects that mitigate climate change (World Bank 2015). The latest updated 2016 Green Bond Principles provide broad categories for suitable green activities (International Capital Market Association 2016):

- Renewable energy
- Energy efficiency
- Pollution prevention and control
- Sustainable management of living natural resources
- Terrestrial and aquatic biodiversity conservation
- Clean transportation
- Sustainable water management
- Climate change adaptation
- Eco-efficient products, production technologies, and processes.

The first Climate Awareness Green Bond was issued by the European Investment Bank (EIB) in 2007. Since then, the green bond market is expanding rapidly. In the U.S., Massachusetts issued the first municipal green bond of \$100 million in 2013 for environmental projects. As of 2015, state and local governments have issued about \$7.5 billion in green bonds (Bloomberg 2016).

Strengths

- attract new capital market investors interested in environmental projects
- improve bond issuers’ environmental performance
- enhance bond issuers’ reputation for environmental sustainability

GFOA WHITE PAPER: GREEN BONDS

“This emerging market faces inconsistent expectation among potential investors, and is not yet evidenced that green bond designation results in a direct financial benefit to issuers”
The white paper offers considerations to issuers considering such financing instruments.

<http://gfoa.org/sites/default/files/GFOA%20Green%20Bond%20White%20Paper.pdf>

Weaknesses

- additional monitoring and reporting green projects
- less developed market than traditional municipal bonds

Example

- In 2016, New York’s Metropolitan Transportation Authority (MTA) issued \$500 million in Transportation Revenue Green Bonds for infrastructure renewal and upgrade projects on the New York City transit.

2D. Social Impact Bonds (SIBs)

SIBs are an innovative performance-based financing tool that enables governments to pay for programs that meet the expected outcomes (Harvard Kennedy School 2013). SIBs are not a municipal bond with a fixed rate of return. Instead, they are a financing instrument in which repayment of principal and a rate of return are contingent on the success of achieving agreed-upon program goals.

For instance, in New York City, the goal of one social impact bond program is to reduce recidivism among the target population by 8% and to increase employment by 5%. Investors will be repaid if either or both of these outcomes are achieved; however investors stand to lose all but 10% of their investment if the outcomes are not achieved (The City of New York 2012). In this sense, SIBs are a debt financing tool that pays for success. In most cases, SIBs are used to finance social infrastructure projects such as hospitals, prisons, and affordable housing. The first SIB was issued in the United Kingdom in 2010, and was then followed by 14 others in the UK and

the U.S. in 2012. As of August 2014, 25 SIBs have been implemented globally, raising a total amount of more than \$100 million (Social Finance 2014).

Strengths

- attract new investors from nonprofit organizations, philanthropic foundations, and corporations
- transfer government risks to private and nonprofit sector

Weaknesses

- largely in the experimental phase
- have a complicated contract process
- the at-risk nature of social programs

Examples

- In 2012, New York City issued the first SIB of \$7.2 million for a prisoner rehabilitation program to reduce teen recidivism.
- In 2016, the city of Denver developed a SIB initiative of \$8.7 million to provide housing and supportive case management services to at least 250 homeless individuals.

Five New Financial Arrangements

1. Public-Private Partnerships (P3s)

P3s are contractual arrangements in which governments form partnerships with the private sector to design, finance, build, and operate and/or maintain infrastructure such as toll roads, water supply facilities, and wastewater treatment plants (U.S. DOT 2012). Many different types of P3s exist because each of the five elements of development (design, finance, build, operate, and maintain) can be combined. For instance,

- In the design-build (DB) arrangement, a government agency establishes a contract with a private company that assumes the design and construction phases of the transportation infrastructure projects.
- In the design-build-operate-maintain (DBOM) arrangement, contracted private entities are responsible for project design and construction, and also take the responsibility of the operation and maintenance of transportation projects. Public agencies are in charge of financing and theoretically pass all the risks related to operating costs and project revenues to the private partner.

A local government considering the use of a P3 should exercise caution, according to a GFOA Advisory: Public Private Partnerships (P3). In this advisory, the GFOA notes that P3 agreements also contain varying degrees of risk, and some organizations have pursued projects that have been controversial and detrimental to the short-term and long-term fiscal health of the public sector entity.

- In the design-build-finance-operate-maintain (DBFOM) arrangement, private entities also take the responsibility of fully or partially funding transportation projects. Revenue generated from transportation projects (tolls or fares) is used to pay for the project costs. Public agencies still retain the ownership of privately built transportation projects.
- The last type of P3s is a concession, which means a private entity makes an upfront payment and is contractually obligated to participate based on an established concession goal, a compensation structure over a specified term.

As of June 2016, 34 states had authorized P3-enabling legislation with varying degrees of favorability to private investment in public infrastructure.

Strengths

- shift project finance risks and long-term operations and maintenance responsibilities to the private sector
- leverage private capital and tap private sector expertise
- avoid more debt issuance and preserve bond capacity

Weaknesses

- complicated contracts and complex negotiations
- require high degree of expertise in-house or hiring consultants
- demand huge efforts of enforcement and monitoring contracts
- loss of public control and flexibility
- complex P3 may require that the government hire external consultants with necessary expertise

Example

- The PortMiami Tunnel project is a recent example of a successful P3 that uses the design-build-finance-operate-and-maintain (DBFOM) model. It opened on August 3, 2014. Under the 35-year concession agreement, the Florida DOT in partnership with Miami-Dade County and the city of Miami made milestone payments to the concessionaire (MAT Concessionaire, LLC) during the construction period. After the project construction, the Florida DOT makes availability payments (capped at \$32.5 million per year) to the concessionaire; these payments are contingent on service quality. The tunnel will be returned to the Florida DOT in October 2044. The total cost of design and construction is \$668.5 million. Florida DOT shared half of the capital design and construction costs and assumed all of the operations and maintenance costs. The remaining half of the project capital cost is by paid by Miami-Dade County and the city of Miami.

2. Privatization

Privatization means the transfer of an infrastructure asset owned and operated by governments to a private party through a sale (Megginson and Netter 2001). In the case of privatization, governments give up direct control and ownership in return for private payment for the operation of infrastructure services. Privatization can benefit the government via the transfer of risk, leverage private sector financial resources. But it can cost the government because they pay a premium to transfer the risk, and can be politically controversial.

Strengths

- obtain upfront payment and quick construction of the facility
- transfer government risks to private and nonprofit sectors

Weaknesses

- complicated contracts and complex negotiations
- demand huge efforts of enforcement and monitoring contracts
- loss of public control and flexibility
- overnments pay a premium to transfer the risk

Examples

- In 2005, the city of Chicago leased the Chicago Skyway, a 7.8-mile city-owned toll road, for 99 years to private investors for \$1.83 billion. The concessionaire was responsible for operating and maintenance costs and collecting toll revenues. The concessionaire, in turn, significantly increased the toll rate.
- In 2006, the city of Chicago and the Chicago Park District leased four city-owned downtown parking garages for 99 years to Morgan Stanley for \$563 million. The main reason for leasing parking garages was that parking fee revenues were insufficient to pay for the city's parking debt service. Similarly, in turn, the concessionaire increased parking fees in order to honor the agreement with the City.
- In 2009, the city of Chicago also leased its 36,000 on-street meters for 75 years to private investors for \$1.2 billion.

Although these three high-profile privatizations generated billions of dollars in one-time asset lease proceeds, they were controversial. Leasing the parking facilities resulted in an immediate increase in parking costs for local residents and businesses. In most Chicago neighborhoods, parking meter rates increased from 25 cents an hour to \$2 an hour. Downtown parking meter rates increased from \$3 to \$6.50 an hour. In addition, Chicago's parking meter privatization was criticized as an unfavorable deal because the city could have earned \$1.5 billion instead of \$1.2 billion if it had kept its parking meters and raised meter rates to the same levels as the concessionaire. Similarly, the Chicago Skyway deal was also criticized as unfavorable to the city. Political controversy remains a challenge for city officials.

3. Infrastructure Investment Funds (IIFs)

An infrastructure investment fund generally refers to an entity in which large investors—such as pension funds, sovereign wealth funds, private insurance companies, and investment banks—pool their financial resources and employ experienced fund managers to invest their fund equity into various kinds of infrastructure assets (Poole 2015, p. 1). Infrastructure funds have shown strong interest in long-term infrastructure projects with low-risk investment, a reasonable return, and stable cash flow. It is estimated that infrastructure funds have raised about \$300 billion of equity capital from 2004 to

2014 (Poole 2015). Institutional investors comprise the major source of equity capital for infrastructure fund. A recent study by Standard & Poor's Ratings Service (2015) highlights the potential of institutional investors to help close the global infrastructure financing gap, estimating that there is a potential to close this gap by as much as 20% from 2015 to 2030.

Strengths

- quickly obtain upfront capital
- attract new and global private investors
- a long-term and stable private equity source

Weaknesses

- increase project financing costs due to higher return interest rate with private equity
- higher turnover of institutional fund managers

Example

- In 2015, the Dallas, Texas, Police and Fire Pension System (DPFP) had an infrastructure asset allocation of \$197 million, equal to 6.7% of its nearly \$3 billion in total assets. The 2015 DPFP reported that a part of these infrastructure assets was invested in hospital and water treatment plant projects in Asia and also in managed highway lanes in Texas.

4. Private and Nonprofit Philanthropic Partners

Philanthropic organizations, private foundations, and a range of nonprofit organizations are showing a growing interest in investing in local infrastructure. These organizations can make either donations or grants with a charitable purpose to support building or operating local infrastructure. In addition, foundations can sometimes make program-related investments to support their philanthropic mission and leverage their donations, such as supporting local affordable housing and community development projects, rehabilitating historic buildings, and preserving open space (U.S. Bipartisan Policy Center 2016). In these cases, philanthropic investments allow the recipient to borrow capital at lower rates, or simply borrow less. The repayment or return of equity can be recycled for future charitable infrastructure investment.

Strengths

- attract new investors from nonprofit and private sectors

- leverage a large amount of financing quickly
- preserve public funding capacity

Weaknesses

- apply and compete for limited funding
- subject to donor requirements and control

Examples

- In Dallas, Texas, private corporate and individual donors made a funding contribution to the design and construction of the Margaret Hunt Hill Bridge in 2013. Private donations contributed \$16 million of the \$182 million project cost, including \$12 million from Hunt Petroleum.
- In Detroit, Michigan, a coalition of private-sector philanthropic and business leaders committed \$100 million in 2014 toward building and operating a new streetcar line along Woodward Avenue in the downtown area. The total estimated project cost was \$137 million, with additional funding from state and local governments.

5. Crowdfunding

Crowdfunding is the sourcing of small amounts of funds from a large group of individuals (Ross 2015). It is an emerging method and has become increasingly popular for raising donations for relatively small civic infrastructure projects. Crowdfunding builds a connection between entrepreneurs whose goals is to raise the fund (the fundraisers) and investors (the crowd) who are willing to invest small amounts through an Internet-based intermediary (an online platform). Crowdfunding has been successful in funding small municipal infrastructure projects. In the U.S., a total of more than \$10.5 million has been raised by more than 1,200 civic crowdfunding campaigns since 2010. More than 60% of these civic crowdfunding campaigns have successfully reached or exceeded their target amount (Gasparro 2015).

Strengths

- reduces the capital costs associated with privately financed infrastructure
- funds small infrastructure projects quickly
- increases political will to support infrastructure development
- involves local citizens in a civic investment

Weaknesses

- difficult to fund large infrastructure projects
- may require significant resources (money and time) on funding campaign
- risk of online platform closure and failure

Examples

- In 2013, the city of Memphis, Tennessee, issued a crowdfunding campaign to help build a local bike transportation project. This is the first American bike transportation project that will be paid for in part by crowdfunding. A total of \$78,000 was raised to cover part of the project cost.
- In 2014, Denver, Colorado, used crowdfunding to raise \$35,000 from 250 individuals and small businesses to fund the remaining amount needed to build the Arapahoe protected bike lane project. This crowdfunding effort not only reached the financing goals but also raised citizens' awareness about bicycling.

CASE STUDIES OF ALTERNATIVE LOCAL INFRASTRUCTURE FINANCING

1. Local Option Taxes: The Cities of Chicago and San Antonio

Introduction

Local option taxes (see Table 3) are authorized by state governments and give local governments the authority to levy taxes at their option, at different rates (within a range). There are often limitations on the uses of these funds and sometimes limits on the duration of the tax. Often, too, there are restrictions on the use of revenues from these taxes, and in some cases, revenues are dedicated to infrastructure costs. The most common local option tax is the retail sales tax, followed by motor fuels taxes, income and payroll taxes, and motor vehicle registrations. According to the National League of Cities, 29 states authorize local sales taxes, and voter approval is required in 18 states. Cities in 20 states have dedicated portions of this tax for infrastructure (NLC 2016).

Sixteen states authorize a local fuel tax, but only eight states currently use this option (NLC 2016). In five states (Alabama, Georgia, Hawaii, Florida, and Virginia), this tax is used but voter approval is not required.

Three other states (Illinois, Missouri and Oregon) use the local option fuel tax and require voter approval. In most states, the proceeds of this tax are used for construction and maintenance of highways and local roads.

Twenty-six states authorize local taxes on motor vehicle registrations, either through a personal property tax or a wheel tax. The tax is used in 21 states, and voter approval is required in 8 states. These taxes vary significantly in their design. Some are flat-rate taxes, some are based on the value of the vehicle, and others are based on characteristics such as weight, age, or number of wheels. The proceeds of these taxes go to highways and roads in 17 states, and to transit in 3 states (NLC 2016).

Chicago, Illinois (population 2,720,546)

Chicago and its suburbs have several levels of government involved in providing transportation infrastructure: the state, county, city, Regional Transit Authority (RTA), and other special districts. Several non-property taxes contribute directly or indirectly to either transportation infrastructure or operations. They include motor fuel excise taxes by the state, city, and county; retail sales taxes levied by the state, county (six counties in the metropolitan area), city, and RTA; state motor vehicle registration fees; revenues from tolls and transit fares; and a tax on parking garages. In addition, these governments use a variety of alternative forms of funding such as value capture through use of a transit facility improvement area, tax increment financing, TIFIA loans, and public-private partnerships.

In Illinois, the general sales tax is assessed on motor fuel in addition to the motor fuel tax. As a result, there is a layering of both sales and excise taxes on gas purchases. Also, both the city of Chicago and Cook County levy a motor fuel excise tax, so purchases in the city bear both taxes. A study in 2014 found that in the city of Chicago, the total of sales and excise taxes on gasoline was \$0.83 per gallon, or 24.8% of the net price (Gowins 2014). Some of these revenues go to special districts or road funds for transportation operations or capital improvements. Others go to general funds and so do not necessarily fund transportation. There is a proposed constitutional amendment to create a transportation "lock box" to ensure funds go to transportation instead of to other expenditures.

Recently, the Metropolitan Planning Council in Chicago proposed a \$0.30 per gallon increase in the state motor fuel tax and a 50% increase in the registration fee.

Together these would generate an estimated \$43 billion over 10 years (Metropolitan Planning Council 2016). The Metropolitan Planning Council argues that this is significantly less than the amount spent by motorists on extra vehicle repairs from poor road conditions and the cost of congestion to commuters. Further, the council argues that underfunding makes the state less economically competitive and accelerates obsolescence of infrastructure.

The use of multiple revenue sources makes it easier for local governments to match federal funding and to use value-capture strategies and credit enhancement tools such as TIFIA. The advantage of multiple revenue sources is that they reduce the volatility of revenue and, as mentioned above, allow for one revenue source to leverage another source. However, some have complained about the complexity and lack of transparency caused by the multiple revenue sources and the involvement of several levels of government. Finally, while excise taxes on motor fuels typically are dedicated to road or transit funds, it is more controversial about whether or not sales taxes on fuel should be dedicated to transportation.

Key Barriers and Challenges

- The complexity and lack of transparency associated with the multiple revenue sources imposed by different levels of governments
- The controversial regressive nature of local option taxes

Lessons Learned

- Leverage revenues from local option taxes to match federal funding and other funding sources
- Make sure that local option taxes revenue from transportation are used for transportation projects

San Antonio, Texas (population 1,436,697)

San Antonio uses two non-property taxes to fund infrastructure costs. The first is a hotel occupancy tax. The tax totals 16.75%; 6% goes to the state, 1.75% to the county, 7% to the city general fund, and 2% for bonds issued by San Antonio's public facilities corporation to expand its convention center. To repay the convention center debt, all available revenues of the city were pledged as security for the bonds, which gave the issuance a good credit rating. Despite this broad pledge of tax authority, it was important to the city to only use proceeds of the hotel occupancy tax, which they have been able to do.

A second tax supporting infrastructure costs is the city sales tax. The city has a general sales tax of 2%, on top of the state rate of 6.25% for a combined rate of 8.25%. The local tax is divided in several ways. The parts that pay for infrastructure costs include 0.5% for the Metropolitan Transit Authority (MTA), 0.25% for the Advanced Transportation District (ATD), and 0.125% for the Edwards Aquifer Protection Project and Parks Development and Expansion Venue Projects. The sales tax is the largest part of capital revenues for the MTA, providing \$190 million in 2014 (City of San Antonio 2014). The ATD projects include "bike facilities, bus pads, school zone markings, traffic signal detection, audible pedestrian signals, and improvements to sidewalks and intersections as well as transportation improvements such as sidewalks and repaying debt for traffic light synchronization" (San Antonio 2016).

One-eighth of 1% from the sales tax supports parks and water quality projects. The Parks Development and Expansion Venue Project is for linear parks, a set of trails along creeks and rivers for bicycling, running, and walking. The Edwards Aquifer Protection Venue Project uses these funds to purchase properties or easements to limit development in sensitive recharge areas around the aquifer. The referendum has been approved four times in 2000, 2005, 2010, and 2015, respectively.

The city is transparent about the use of funds from both the hotel occupancy tax and the sales tax. Public support was required for referendum passage and in some cases, credit ratings were enhanced by the transparency and the explicit earmarking of funds for these projects. Earmarking of revenues does restrict the usage of the funds, which may constrain the budget in undesirable ways. These taxes did provide revenue needed for these infrastructure projects without adding to the property tax burden.

Key Barriers and Challenges

- Need to obtain public support for referendum passage
- Earmarking local option taxes revenues may restrict future budget flexibility

Lessons Learned

- Be transparent about the use of funds from local option taxes
- While earmarking revenues for specific projects provides a clear connection between tax revenues and project spending, pledging the taxing authority

of the government to support the project provides lower interest rates.

2. Public Private Partnerships: The City of Portland's Extension of MAX Light Rail Line

Introduction

Public Private Partnerships (P3s) have been defined as “a contractual arrangement between a public agency and a private sector entity. Through this agreement, the skills and assets of each sector are shared in delivering a service or facility for the use of the general public. In addition to the sharing of resources, each party shares in the risks and rewards potential in the delivery of the service and/or facility.” (National Council for Public-Private Partnerships).

Many different types of P3s exist. They are often characterized by dividing the responsibility for the five major functions of project development (design, build, operate, maintain, and finance) between the government and the private entity. Yescombe (2013) identifies the key characteristics of P3s as:

- A long-term contract between the public and private organizations
- Private assumption of one or more of the responsibilities and risks of designing, building, operating, maintaining, and financing a project
- Reimbursement of the private party by the public agency for the investment and risk of the project
- Ownership of the facility remaining with the government or, as agreed upon, being transferred at a specified time.

As of June 2016, 34 states had authorized P3-enabling legislation. In the survey, 119 of 604 governments responded that they actively used P3s. These governments tended to be larger, probably because the complexity of P3s requires a high degree of expertise. The resources to learn about the benefits of and the challenges to P3 have grown rapidly, and one of several useful case studies is discussed below.

Portland, Oregon (population 609,456)

A P3 was used to build an extension of the Metropolitan Area Express (MAX) light rail line to link the urban core of Portland to Portland International Airport (PDX). Three other transit stations were part of the project. The MAX system is operated by TriMet, a public agency that provides bus and rail transit in the Portland metropolitan area, and PDX is operated by the Port of Portland. TriMet and PDX joined with the Portland Development Com-

The Government Finance Officers Association alerts local governments to “understand what is at stake and make informed, strategic decisions on whether or not to pursue P3 opportunities”. In addition, they recommend that finance officers should be involved throughout the process of a government’s consideration of potential P3 opportunities.

mission (an independent city economic development authority) to agree to a P3 with Bechtel Enterprises.

Bechtel provided funding for 23.1% of the project’s \$128.8 million construction and engineering costs of the rail link and received a sole-source, no-bid contract to design and build the extension. In return, Bechtel received the right to develop a mixed-use development near the new MAX station. The development included office space, retail, hotels, and a gas station. The three public agencies paid for the remainder of the rail link construction and engineering costs. Transit fares partially offset operating costs. No federal funds were used. The project was completed more than 10 years earlier than had been planned. It is estimated that the public costs to develop the extension were reduced by about 23% by the P3 (Gosling and Freeman 2012, p. 11). The extension improved transit access to the airport and encouraged greater use of transit for airport trips.

This example demonstrates how a project can leverage values in ways that could not be done without a private sector partner. Private developers can use new transit stops for retail, office, or commercial development and often extract more value than public agencies typically can. Public agencies benefit from completing the projects faster. In this case, the improved airport access was an additional benefit for the region. It did require the city to agree to waive bidding requirements and agree to a sole-source contract with Bechtel. Public participation did not occur until after the negotiation and design, and so was less influential. A high level of trust between the partners was important.

Key Barriers and Challenges

- Balancing the profit goal of private contractors with the public interest
- Accomplishing meaningful citizen input in the project development

Lessons Learned

- Leverage private capital can create more value
- Maintain a high level of trust between the partners
- Look for opportunities to accelerate project completion

3. Crowdfunding: The Cities of Culver and Nephi

Introduction

Crowdfunding is the sourcing of small amounts of funds from a large group of individuals (Ross 2015). Crowdfunding involves three parties or groups: fundraisers, investors, and an Internet-based intermediary. This emerging method has become increasingly popular for raising small donations, typically for private projects. It has been successful in funding small municipal infrastructure projects. In the U.S., a total of more than \$10.5 million was raised by more than 1,200 civic crowdfunding campaigns since 2010. More than 60% of these civic crowdfunding campaigns have successfully reached or exceeded their target amount (Gasparro 2015).

Culver, Oregon (population 1,442)

The city of Culver, Oregon, was approached by the family, friends, and “church family” of a child who passed away, to honor his memory by building a splash pad in a park. The city told the group that if it would raise the funds, the city would provide the land and assume the ownership responsibility and costs for the splash pad. The group used a crowdfunding approach to raise funds through gofundme.com. In addition to this source, the school and the Rotary Club held bake sales for this cause as their fund-raising events for the year. In total, these groups raised about \$33,000. This project caught the attention of a pool company that donated the splash pad. Additional funds raised were used to purchase equipment not donated (such as a UV pool sanitizer), and the city will pay for maintenance, repair, and replacement. Remaining funds will pay for other amenities such as benches and facilities.

The group raised the funds and worked with the city to authorize payment of project bills with crowdfunded money. There were no legal barriers or restrictions to using this tool. The impetus came from the family, community, and the church, and the funds were raised very quickly, so within a year the project went from an idea to a reality. At the same time, however, the operating costs have been high, and the city was not prepared to take on this expense. Also, the city will need to decide

how to pay the costs of maintenance and replacement in the future.

Nephi, Utah (population 5,560)

The city of Nephi, Utah, has a baseball field that did not have lights. With a strong need for the lights, the city approached several foundations for contributions. The foundations were willing to help, but wanted to see some local effort. A city intern suggested crowdfunding, established a request on the RocketHub website, and received donations there. The presence on RocketHub reached some people whom they might not have reached otherwise. The city also publicized the fundraising effort through traditional media, which attracted other donors, some of whom were less comfortable giving through RocketHub or wanted to be recognized for their donation. In the end, the funding came from three sources: five foundations provided a total of \$112,500, and direct donations and crowdfunding provided \$12,500. There were no legal barriers and no restrictions. The city administrator said there was not much risk in crowdfunding in this case. It can create wider support but it can be a slower process.

In both cases, crowdfunding was one source that was complemented by others. Indeed, the publicity created by crowdfunding seems to have helped leverage other donations. Both projects were relatively small and for recreational infrastructure, which may be a more compelling project for donations than other types of infrastructure. As with any infrastructure project, the local government needs to keep in mind future costs for operations, repair, and replacement. The lack of legal barriers and restrictions made it easier to raise funds this way, and the risk seems minimal.

Key Barriers and Challenges

- Online fundraising has limited potential in how much it can raise
- The projects amenable to crowdfunding seem to be specific types of infrastructure, such as recreation.

Lessons Learned

- Be creative to use new online fundraising websites
- A good project with documented need and public benefits will be of interest
- Transparent on the fundraising progress

4. Federal TIFIA Loans: Los Angeles County's Crenshaw/LAX Transit Corridor

Introduction

In 2012, the U.S. DOT awarded a \$545.9 million TIFIA loan to Los Angeles County Metropolitan Transportation Authority (LACMTA) to help build a new light rail transit line along the Crenshaw corridor. Revenue from a voter-approved local option sales tax was devoted to paying back the TIFIA loan.

Project Background

The Crenshaw/LAX transit corridor project includes construction of a new 8.5-mile light rail line and six new transit stations with off-street parking. The new light rail line linked existing rail service on the Metro Green Line with the Metro Exposition Line. It connected downtown Los Angeles, West Los Angeles, and the South Bay, and made it easier for the region's residents, workers, and visitors to reach downtown Los Angeles, the Westside, South Bay, and the cities of Inglewood, Hawthorne, and El Segundo. The project also built a new transit vehicle maintenance and storage facility.

The Los Angeles County Economic Development Corporation estimated that the rail line would not only generate approximately 15,100 jobs directly related to the rail project but also generate more spending in the economy by project workers (LACMTA 2010). The project was expected to cost \$1.75 billion. The 30-year federal TIFIA loan of \$545.9 million was the largest federal funding source for the project. The loan interest rate was lower (2.43%) than the market rate. The TIFIA loan will be repaid from the proceeds of a half-cent sales tax approved by Los Angeles County voters in 2008 (LACMTA 2010). The rest of project funding came from state general obligation bond proceeds and local voter-approved sales tax measures devoted to transportation.

Key Barriers and Challenges

- TIFIA loan program becoming increasingly competitive in recent years
- The need to maintain adequate coverage requirements to ensure repayment
- Paperwork required to secure a federal TIFIA loan

Lessons Learned

- Access to federal credit expedited project delivery. The award of the federal TIFIA loan allowed the

project sponsor to start the project earlier than would have been possible using a pay-as-you-go approach

- It is important for the project sponsor to consult with a financial advisor early during the project development process to structure reliable repayment sources
- The project sponsor (LACMTA) was able to rely on a stable local revenue source (voter-approved local sales surtax tax) to secure the federal TIFIA loan

5. State Infrastructure Bank Loan Assistance: The City of Gahanna's New Overpass

Introduction

Ohio has one of the most active and successful state infrastructure bank (SIB) programs among the states. The Ohio SIB was initially capitalized with \$87 million in Federal Title XXIII Highway Funds, a match fund of a \$40 million authorization of state general revenue funds (GRF) from the Ohio State Legislature, and \$10 million in state motor fuel tax funds (Ohio DOT website). Since the inception of the program in 1997, the Ohio SIB has issued 187 loans totaling \$572 million to help local governments build various kinds of transportation projects (Ohio SIB 2016).

Project Background

In 2009, the City of Gahanna, Ohio, planned to build an overpass over the Columbus Outerbelt (I-270) that connects an isolated section of Gahanna with the rest of the community. This project was assumed to be a boon for local economic development efforts, as the now-connected portion of town is the last large, undeveloped land available for development. The total project cost was estimated to be \$8,147,500. The city's involvement with the Ohio SIB program was facilitated through the regional metropolitan planning organization, the Mid-Ohio Regional Planning Commission (MORPC), which allocates federal attributable funds. Each year MORPC receives an obligation of approximately \$33 million of federal funds to use for transportation projects in central Ohio. These funds come from the Surface Transportation Program, Congestion Mitigation and Air Quality Improvement Program, and Transportation Alternatives Program.³

In 2010, the Ohio SIB awarded a five-year short-term loan of \$6,347,508 to the city of Gahanna. The loan interest rate was 3%. The loan was used for the

construction of a new 3,000-foot roadway on State Route 317 (Ohio SIB 2011). The project includes the construction of a new structure over I-270 which will tie a new roadway into the Tech Center on the north side of I-270. MORPC handled the bulk of the administrative work related to the SIB loan and paid its share with federal attributable funding. The SIB loan made it possible for the city to complete the work years ahead of the next round of federal attributable funds.

Key Barriers and Challenges

- Administrative work in the loan application and loan enforcement
- Challenge to negotiate and structure loan term and repayment sources

Lessons Learned

- Access to the state infrastructure bank loan helping to expedite project delivery
- Importance of successful collaboration with regional metropolitan planning organization
- Value of support from the state government in the use of SIB loan program

6. Green Bonds: The City of Saint Paul's Sewer Revenue Green Bonds

Introduction

The city of Saint Paul, Minnesota, recently issued Minnesota's first green bond in 2015 and became one of the first green bond issuers in the nation. The bond proceeds are used for clean water and sustainable water management made possible by improving the city's sewer system. This alternative debt financing tool not only achieves the goal of advancing the city's commitments to promote environmental sustainability.

Project Background

The city of Saint Paul has traditionally used tax-exempt municipal bonds to fund capital projects across the city. Bond issuance for the past two years has been used to fund the Saint Paul sewer utility's capital project needs, including sanitary and stormwater sewer repair, maintenance, rehabilitation, testing, and other quality improvements. All these projects have an environmental impact. With the commitment by the city's administration to make sustainability and green initiatives a priority in St. Paul, the city began to explore the potential issuance of green bonds as part of its annual infrastructure debt financing program in late 2014 (City of Saint Paul, Office of

Financial Services 2016). In 2015, the city's \$8.7 million Sewer Revenue Green Bonds were the first sold in Minnesota. In 2016, the city issued its second Sewer Revenue Green Bonds series for a total of \$8 million (City of Saint Paul, Office of Financial Services 2016). Both bonds are secured solely by revenues of the city's sewer utility.

The city has established formal processes and procedures to ensure that the program complies with the International Capital Market Association green bond principles, which include proper categorization and use of proceeds, project evaluation and selection, and reporting. The latest sewer revenue green bond report has been posted on the city's website. The report provides investors in the city's green bonds information regarding the financed projects and their environmental impact. The city is proud of the green bond program and of being the first in the state to issue green bonds as well as its ability to finance projects that make a difference in the environment in Saint Paul. The green bond program can open up the market for city bonds to new investor groups (those seeking socially responsible and green investments) as well as forge connections in the community. In addition, the perception of the city as a leader in sustainability will bring other intangible benefits.

Key Barriers and Challenges

- Restricted to financing local infrastructure projects with an environmental impact
- Ensuring compliance with green bond principles and rigorous standards in project selection and evaluation, tracking, management of bond proceeds, and reporting the environmental performance of the projects

Lessons Learned

- It is important for a community to buy into the green bond best practices and commit to the underlying goals of the designation rather than just issuing green bonds as a novelty
- Working with municipal financing experts, such as municipal advisors, is crucial to the identification of and compliance with the best practices of executing and following up on a green bond sale

7. Social Impact Bonds: Denver Social Impact Bond Program to Address Homelessness

Introduction

The Denver Social Impact Bond program is a recent innovative initiative aimed at utilizing funds from private

investors to provide permanent housing and supportive services to at least 250 chronically homeless individuals who frequently use the city’s emergency services, including police, jail, the courts, and emergency rooms. The city of Denver only pays for success when specific performance outcomes are achieved. This program’s goal is to provide better lives for participants and yield cost savings to the city’s criminal justice and health systems.

Project Background

Similar to many communities across the nation, the city of Denver faces a challenge of stretched resources for programs working to prevent homelessness. The Denver Crime Prevention and Control Commission (DCPCC) has pointed out the annual average cost to taxpayers per homeless individual is \$29,000, consisting of the cost of police crime, jail days, detox programs, emergency room visits, and other health care expenses. It is estimated that each year, the city spends approximately \$7.3 million on costs associated with homelessness (Denver Foundation 2016).

To better serve the most vulnerable homeless individuals and save taxpayers’ dollars, the city of Denver established an agreement with Denver PFS LLC, an entity

established to implement the Social Impact Bond program. The estimated amount of total private investment in the program is \$8.7 million. Meanwhile, an extra \$15 million of federal resources will be leveraged over the next five years to build 210 new housing units for participants (City and County of Denver website 2016). The city’s repayment to private investors is contingent upon the achievement of the program’s outcome targets, ranging up to a maximum of \$11 million. If the expected outcomes of a 35%-40% reduction in jail bed days and 83% housing stability among the target homeless population is achieved, the city would pay \$9.5 million (City and County of Denver website 2016). The city will pay less if outcomes are not achieved. The savings and benefits from the reduced costs in the criminal justice system will be captured by the city and used to repay lenders for their upfront investment to cover the cost of the program.

Key Barriers and Challenges

- Time-consuming process to get stakeholders to buy into the idea of using social impact bonds
- Challenges to work with a variety of government agencies at different levels and stakeholders across different sectors

Table 4 Denver Social Impact Bond Program Structure

Intermediaries	Corporation for Supportive Housing (CSH) and Enterprise Community Partners
Providers	Colorado Coalition for the Homeless and Mental Health Center of Denver
Payment Outcomes	Housing stability (city only pays if a participant spends at least one year in housing)
	Percent reduction in jail bed days (payment made based upon the percentage reduction seen between participants and nonparticipants over at least three years)
	\$8.63 million with outcome payments split between the above two measures
Social Investment	Lenders: Laura and John Arnold Foundation, Living Cities Blended Catalyst Fund, Nonprofit Finance Fund, The Ben and Lucy Ana Fund at the Walton Family Foundation, The Colorado Health Foundation, The Denver Foundation, The Northern Trust Company, and The Piton Foundation
Project Length	At least 250 individuals with up to five years of services
Project Evaluation	Randomized control trial (RCT) conducted by the Urban Institute
Technical Support	Harvard Kennedy School of Government Performance Lab

Source: Nonprofit Finance Fund (2016).

Lessons Learned

- The social impact bonds program can play a key role in particular situations when the government wants to engage partners in addressing critical social issues
- Get buy-in to use the social impact bonds from governments, service providers, and private investors before proceeding
- Create synergy and develop partnership among program participants
- Make sure that the social impact bonds initiative matches the top priorities of local governments

CONCLUSIONS: TAKING ACTION

Local governments across the U.S. are facing a serious infrastructure deficit and are exploring new ways to finance the needed expansions, upgrades, and repairs. Eroding infrastructure threatens citizens' safety and quality of life. Traffic congestion continues to grow, costing commuters millions of dollars in wasted gas and thousands of hours of lost time. Water and wastewater are critical for human needs and environmental preservation. And utility services are demands citizens expect from their local governments.

At the same time, citizens are reluctant to pay more in taxes, and many federal sources of funding are inadequate. To help address the challenges of infrastructure financing, local governments are taking a combination of traditional and alternative approaches to fund and finance their infrastructure investments. Alternative infrastructure financing is not likely to replace traditional methods of infrastructure financing because it is relatively new and many local governments are well-served by traditional infrastructure funding sources and municipal bonds. Nonetheless, new financing alternatives are effective complements to traditional funding sources and efficient conduits to low-cost borrowing for many local communities. In addition to their specific benefits, these innovations can effectively stretch scarce federal and state funding sources, leverage private funds, and enable local governments to accelerate project completion with greater flexibility. We would expect alternative methods of infrastructure financing to become more prevalent in the long run.

While infrastructure financing presents unique challenges, it also offers opportunities for both the public and private sectors. We suggest that local government manag-

ers consider these key aspects of successfully expanding and enhancing use of alternative infrastructure financing:

- First, innovations in local infrastructure financing may require changes in state and local laws and administrative arrangements. Obtaining legislative approval to authorize the use of innovative infrastructure financing is a critical first step. To win support, effective education of the public and legislators is necessary. Local government managers need to explain the feasibility and benefits of innovative infrastructure financing to legislators and be open to a frank dialogue about alternative financing options. In addition, local government managers need to patiently and persistently educate the public about the potential of innovative infrastructure finance, as well as to consider the risks.
- Second, alternative infrastructure financing strategies often involve complex financing techniques and engage various external financial partners and stakeholders. Effectively working with new partners is often required in these arrangements. Local government professionals need to strengthen their understanding of these techniques, as well as their capacity to manage these financing alternatives. Professional training in this area is available and local government finance professionals should seek out these opportunities. State governments may also need to provide technical advice to local governments about innovative infrastructure financing alternatives they facilitate, such as state bond banks.
- Third, local governments need to take actions to ensure transparency and accountability when using alternative infrastructure financing methods. For instance, local government managers may engage and inform citizens in the process of project planning, selection, and funding. Managers should also provide clear explanations of new financing tools being considered. Simple fact sheets, FAQ documents, and examples of how other communities have used these tools can help improve public understanding. In addition, simplified financial reports about the progress of projects using alternative infrastructure financing can be helpful.
- Matching financing tools with appropriate projects is challenging but potentially rewarding for local managers. As many examples here indicate, good projects with appropriate financing can enhance community wealth, safety, and sustainability. The

selection of the right financing tool requires matching revenues with the flow of benefits coming to the community. This may bring in private sources of funding that reduces the burden on government and achieves broader and more durable support.

In sum, like so many elements of local government, innovation in infrastructure financing is not for the faint of heart. However, the importance of the challenges facing our communities demands a wise and determined approach. Finance is changing, presenting new alternatives and opportunities. This research has identified and illustrated several alternatives and how they have been used in various communities. Matching the appropriate tool to the job is necessary. Local managers then need to use their communication skills and interpersonal relationships to explain how innovation can help reshape communities for the future.

ENDNOTES

- 1 Public goods are, in varying degrees, nonrivalrous in consumption, nonexcludable in use, or both. A good is nonrivalrous in consumption when one person benefits from it without reducing the benefits of others. A good is nonexcludable in use if it is impractical or very costly for one person to maintain exclusive control over its use (Weimer and Vining 2011, p. 72).
- 2 Data about passenger railroads only represents Amtrak passenger railroad infrastructure and fleet/facilities.
- 3 Information was obtained from an interview note with a government official in the city of Gahanna.

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Elizabeth Kellar, ICMA

Amber Snowden, ICMA

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ICMA

777 North Capitol Street, NE

Suite 500

Washington, DC 20002-4201

202.289.ICMA (4262)

icma.org

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GFOA

203 N. LaSalle Street

Suite 2700

Chicago, IL 60601-1210

gfoa.org

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