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Accelerating Infrastructure Investment across the Country

Matt Horton, Misael Galdamez, Ivana Wang, and Charlotte Kesteven

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I.

EXECUTIVE SUMMARY

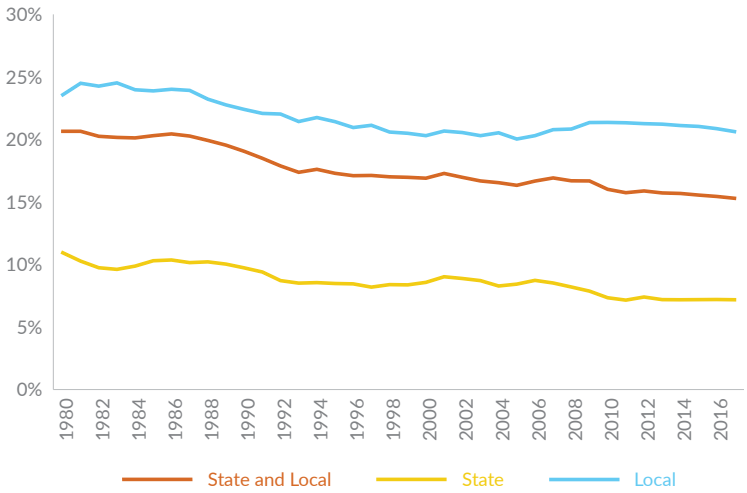
On November 5, 1913, water from the Owens River finally started to trickle into the San Fernando reservoir. Upon the completion of the Los Angeles aqueduct, William Mulholland famously uttered, "There it is, take it," ushering in an era of exponential growth in Los Angeles and beyond. Bolstered by investment in public infrastructure, Southern California's 10 counties grew to support a population of 23.6 million and emerge as a leading global economic center.[1] Many states followed suit, taking responsibility to plan for future growth, often without the assistance of overarching federal guidance or dedicated programs.

After a decade of economic and population growth following the Great Recession of 2008, however, the lack of a coordinated infrastructure investment plan is exacting significant public health, mobility, and economic productivity costs. Numerous commissions, studies, and efforts over the past quarter-century have identified the need for a renewed regional and national commitment to infrastructure investment as a catalyst for economic growth. However, these efforts ultimately failed to mobilize spending for the high-quality infrastructure systems critical to US economic growth and competitiveness. Today, the COVID-19 pandemic has further exposed the weaknesses of our nation's infrastructure investment system and local and state budgets.

Despite the absence of renewed spending, a recent review of infrastructure studies indicates each $100 spent on infrastructure increases private-sector production by an average of $17 long-term.[2] Infrastructure is also vital to any region's ability to tackle today's existential threats—like climate change and inequality. Transportation, for instance, is the single largest source of greenhouse gas emissions,[3] but a mix of increased density and transit could cut emissions in cities globally by a third.[4]

Judging by federal funding trends over the last several decades, however, funding for investments in the built environment—the human-made environment where people work, live, and play—has been tenuous at best. The burden of infrastructure has primarily fallen to state and local authorities. In 2017, state and local governments were responsible for nearly 80 percent of the country's infrastructure spending, the majority of which is borne by local governments.[5]

Figure 1: Infrastructure Spending Is Down across All Government Levels
State and Local Infrastructure Expenditure as a Percentage of Own Spending



Source: *US Census Bureau Annual Survey of State and Local Governments (2019)*

Note: *Infrastructure spending includes air and water transportation, highways, natural resources, parking, wastewater management, utilities, and transit.*

Today, navigating the maze of funding sources and competing regulatory frameworks results in questions and uncertainty for public- and private-sector leaders. How do leaders access and widen the capital pool and modernize infrastructure investment models? How can state and local leaders structure governance frameworks that better align with federal financing tools and incentives?

This report aims to overcome political ambivalence and inaction by establishing a collaborative policy framework to accelerate project delivery, increase investment, and meet local community development goals. For cities, regions, and states to compensate for decades of deferred maintenance and disinvestment, they must reimagine traditional economic development models and leverage a broad array of financial solutions, public and private assets, and incentives.

AT THE FEDERAL LEVEL

WE PROPOSE THE FOLLOWING SETS OF POLICY ACTIONS

1 Authorize Long-Term Surface Transportation Funding and Ensure Highway Trust Fund Solvency

Congress should authorize longer-term surface transportation funding and include priority funding for intermodal transportation. Additionally, Congress must ensure long-term Highway Trust Fund solvency. We suggest user fees priced by vehicle miles traveled.

2 Expand Credit Enhancement Tools to Mitigate Risk and Incentivize Development Partnerships

To attract more private capital, the federal government should expand existing credit enhancement tools and eligible projects.

3 Establish a Predevelopment Capital Fund and Align Federal Incentives

We recommend the creation of a $10 billion federal infrastructure predevelopment fund to accelerate infrastructure development. Access to predevelopment capital funds, however, would require a commitment to resiliency, international performance standards, a plan to address lifecycle costs, and improving access for underserved communities). Federal requirements should also include sufficient data tracking and accountability frameworks. Currently, US infrastructure procurement at all levels values low-cost bids over long-term planning. Federal guidelines should also organize existing tax incentives to stimulate infrastructure development with private-sector partners.

4 Prioritize Projects Addressing Unequal Access to Public Services

Any new legislation authorizing infrastructure spending must prioritize projects that directly address inequalities and historic disinvestment in the built environment.

5 Pass Comprehensive Broadband Legislation

Policymakers must ensure that any infrastructure framework addresses the deficit in broadband architecture and facilitate its construction in rural areas. Congress should also restructure aid programs to prevent program funding overlap, authorize the Federal Communications Commission (FCC) to subsidize home use of devices and connection services, and support public-private partnerships that expand internet access.

AT THE STATE LEVEL

WE RECOMMEND THE FOLLOWING POLICY ACTIONS TO MAXIMIZE FEDERAL DOLLARS AND ATTRACT PRIVATE CAPITAL

1 Bundle Small Projects to Attract Interest from Capital Markets

Long-term institutional investors and private investors are not attracted to small projects. States should bundle small projects into larger packages by infrastructure type or region. Bundling allows for cost savings on design and construction costs and unlocks institutional capital by creating projects of an investable size.

2 Adopt a Regional Economic Framework for Infrastructure Provision

State governments should create regional economic development offices to drive state policy outcomes. Regional offices can coordinate funding, offer technical assistance, establish common standards and data collection systems, and provide specialized workforce training.

3 Mitigate Project Risk by Streamlining the Review Process and Offering Predevelopment Support

State legislators should prioritize infrastructure projects with clear environmental benefits and expedite bureaucratic review processes for new infrastructure investments. States should also offer predevelopment support of 10-15 percent of project costs to infrastructure projects with a clear environmental benefit and linked to performance measures.

AT THE LOCAL LEVEL

WE RECOMMEND THE FOLLOWING POLICY ACTIONS, BASED ON A LAND VALUE CAPTURE MODEL

1 Adopt a Land Value Capture Framework to Generate Sustainable Revenues

When public agencies build new infrastructure or invest in the built environment, they improve land and property values for nearby parcels. Land value capture is a set of tools to transform the increased property values into revenues. By using strategically targeted and well-coordinated land value capture, local agencies can maximize tight federal and state funding and generate continuous, sustainable revenues for infrastructure development.

2 **Assess Local Assets and Define the Opportunity for Development**

The establishment of a facilities commission or investment authority would allow for an inventory of public assets and development alignment with existing projects and land available to further coordinate, streamline, and accelerate regional economic development needs (e.g., housing, business formation, renewable energy generation, broadband).

3 **Leverage Innovative Finance as Funding Mechanism Support for Community Reinvestment**

Establishing a local impact fund that would leverage state and federal credit enhancements tools (e.g., remediation, predevelopment, land acquisition) and tax incentives (e.g., new markets, Opportunity Zones) would add certainty to a regional shovel-ready project portfolio and incentivize outside investment.

4 **Prioritize Additional Revenue Sources to Meet Local Investment and Human Capital Needs**

Greater public-private partnership authority will lead to better coordination with developers in a broader array of infrastructure classes in the newly formed regional project portfolio.

By structuring and aligning many different financial tools and policy reforms, federal, state, and local leaders can leverage new sources of capital and apply other market-based solutions to support an enhanced regional development framework and project delivery pipeline.

The rest of this report is organized as follows: Section II of this report begins with a summary of the macroeconomic, social, and equity benefits of infrastructure investment. Section III analyzes current US infrastructure spending at the federal, state, and local levels to understand the long-lasting implications of disinvestment. Section IV highlights the specific policy barriers each level of government faces in funding and maintaining infrastructure investments, while Section V distills policy recommendations into an actionable roadmap. Section VI offers a concluding summary of major themes.

II.

INTRODUCTION: THE BENEFITS OF INFRASTRUCTURE INVESTMENT

1. Macroeconomic Benefits

Core infrastructure—including roads, railroads, airports, ports, and utilities—forms the foundation of a modern, functioning economy and society. It allows businesses to access raw materials and deliver finished products and gives them access to a skilled workforce.[6] In today's information-based economy, reliable and consistent high-speed internet also facilitates the job-worker connection.[7]

Investment in infrastructure also boosts private-sector productivity. A recent review of infrastructure studies indicates each $100 spent on infrastructure increases private-sector production by an average of $17 long term (median of $13).[8] Additionally, it is one of the most efficient fiscal stimulus measures. By some estimates, each $100 billion in infrastructure spending increases gross domestic product (GDP) by $150 billion in the short term, which would, in turn, boost employment by roughly 1 million workers.[9] Jobs in infrastructure occupations also pay competitive wages relative to other professions nationally while requiring less formal education.[10]

These public spending investments have a more substantial expansionary impact during recessions and when financed through debt issuance.[11] For example, in response to the Great Recession of 2008, Congress passed the American Recovery

and Reinvestment Act (ARRA), an $831 billion stimulus package complete with money for infrastructure. Under ARRA, GDP grew roughly 2 to 2.5 percent from the fourth quarter of 2009 to the second quarter of 2011. Additionally, ARRA increased employment by more than 2.3 million in 2010 alone and continued to have substantial effects on job creation into 2012.[12] Given this, infrastructure spending could help hasten US recovery from the current recession.

Of course, this doesn't require a public-sector role in infrastructure provision. However, if private firms were to provide and maintain infrastructure resources themselves, the high upfront costs of building *new* infrastructure would pose significant barriers to entry for other firms, resulting in a monopoly.[13] Core infrastructure is also part of a broader network or system in which the benefits of a good or service increase with the number of users. As such, efficiency is optimized when investments are consistent throughout the system and not allowed to vary at different points in the network by different actors.[14]

2. Societal Benefits

Beyond its economic and productivity benefits, quality infrastructure is necessary to sustain a decent standard of living. Access to safe drinking water and sanitation, for example, are considered fundamental rights without which it is difficult to maintain health, attain an education, or thrive economically. Infrastructure can also enhance social connection and well-being. The electrification and telephone line installations made possible by the New Deal's Rural Electrification and Telephone Service Act facilitated new social connections and interactions.[15] Quality transportation infrastructure also provides both businesses and consumers with a shorter commute and an improved quality of life.

3. Expanding Access to Disconnected Communities

Infrastructure can also indirectly encourage economic activity and growth in disconnected or sparsely populated places. In the late 1800s, the expansion of the railroad network in the US opened new domestic markets and increased access to workers, consumers, and inputs. The railroads also enabled increased manufacturing in new places that were previously too disconnected or expensive to be efficient. Without this expanded rail network, researchers estimate that US aggregate productivity would have been 25 percent lower in 1890.[16]

But infrastructure policy has historically exacerbated racial and economic divisions. Construction of the Interstate Highway System, for example, prioritized whiter, wealthier, and more suburban communities. In contrast, many urban communities of color were demolished to make room for highways or had highways routed directly through them.[17]

Today, highways still bisect and divide cities along the lines of race and class, disconnecting specific communities from economic opportunity. Communities of color are the least likely to have access to a personal vehicle and therefore depend on public transit. And yet Black and Asian workers are likely to have longer commutes and spend more income on transportation relative to white workers.[18] This lack of access and quality infrastructure extends beyond transportation, however.

Black and Hispanic households are roughly twice as likely to live without modern plumbing compared to whites. Similarly, Native American households are 19 times more likely than white households to lack indoor plumbing.[19] Internet access, too, is unequal: In 2018, broadband internet adoption rates in majority-Black neighborhoods were 16 percentage points lower when compared to majority-white neighborhoods. Similarly, neighborhoods with lower poverty rates had higher broadband adoption rates than those with concentrated poverty.[20] Thirty percent of rural Americans lacked access to broadband internet in 2017.[21] And, on average, rural areas have 37 percent more people without internet access than urban areas.[22] Seventeen percent of people living in rural areas report having experienced issues with safe drinking water, and 12 percent report problems with their sewage system.[23]

Targeted infrastructure investment can expand access to education and employment, reduce poverty, and create economic opportunity. Providing transportation infrastructure to historically disinvested communities can open access to employment, investment, and educational opportunities,[24] and improved physical and digital connectivity can enhance rural economic competitiveness and deep urban-rural bonds.[25] Future investment in transport infrastructure should prioritize communities previously left behind, which would now benefit most from better connectivity.

III.

THE STATE OF US PUBLIC INFRASTRUCTURE INVESTMENT

Despite the rationale for public-sector investment in infrastructure, public spending has often varied. In the decades following World War II, for instance, federal spending drastically transformed America's infrastructural landscape as the US built an interstate highway system, hundreds of airports, a massive network of waterworks, and expanded port facilities.[26] While these investments once equipped our nation with the critical infrastructure it needed to succeed, much of that infrastructure, now in the hands of state and local governments, is in dire need of repair.

1. Public Spending Trends, 1980-2017

Although the federal government previously played a substantial role in financing infrastructure, overall levels of federal investment have significantly decreased. Data from the Congressional Budget Office tracking public spending on transportation and water infrastructure confirm a decline in inflation-adjusted federal spending since the 1980s. In 2017, the federal government spent $98 billion on transportation and water infrastructure, compared to $108 billion in 1980 (amounts in 2017 dollars).[27]

The US currently spends the equivalent of 2.4 percent of GDP on infrastructure, in contrast to European countries, which contribute 5 percent of GDP, on average. Yet this low level of investment has only occurred since the 1980s; during the

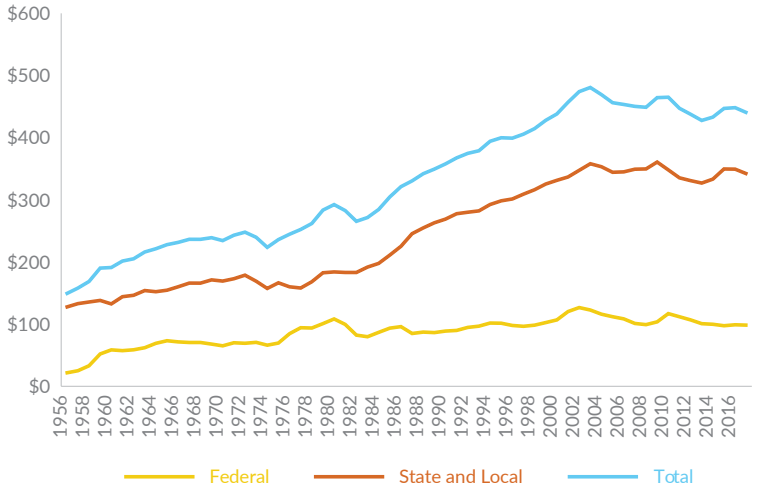
post-World War II growth period, the US allocated 3 percent of its GDP towards infrastructure spending.[28]

Shortfalls in investment are accompanied by a responsibility shift, as the majority of the infrastructure spending has transitioned from national to state and local budgets beginning in the 1980s. While the federal share of infrastructure expenditure rose from 1956 to 1977, these contributions have steadily decreased. By 2017, state and local governments were responsible for nearly 80 percent of the country's infrastructure spending.

Further disaggregating state and local government spending data reveals that this fiscal and managerial responsibility is primarily local. In 2017, infrastructure expenses accounted for 20.6 percent of all local government spending,[29] while state governments spent only 7.2 percent of total expenditure on infrastructure. Moreover, even as all levels of governments allocate less of their respective budgets to infrastructure, local governments continue to outspend state governments. In 2017, local governments spent $228 billion more on infrastructure than state governments, compared to 1980, when local governments spent roughly $100 billion more.

Figure 2: State and Local Governments Bear the Bulk of the Infrastructure Spending

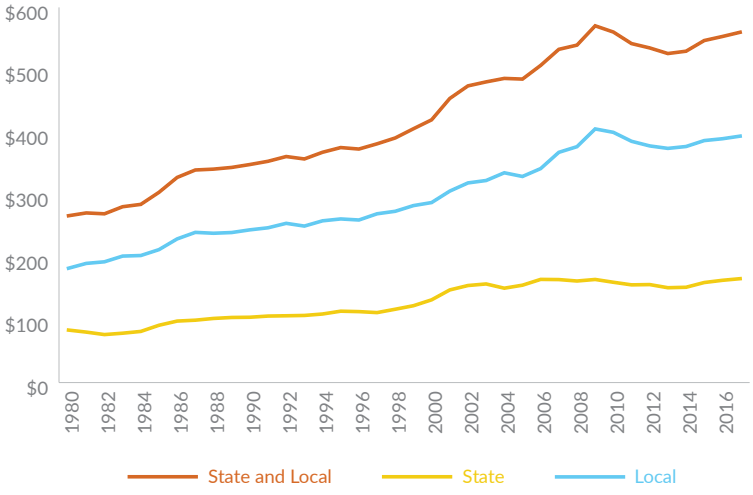
Water and Transportation Spending by Level of Government, Billions of Real 2017 Dollars



Source: *Congressional Budget Office (2018)*

Figure 3: Local Governments Shoulder Most Infrastructure Spending

Aggregate U.S. Infrastructure Expenditure, Billions of Real 2017 Dollars



Source: *US Census Bureau Annual Survey of State and Local Governments (2019)*

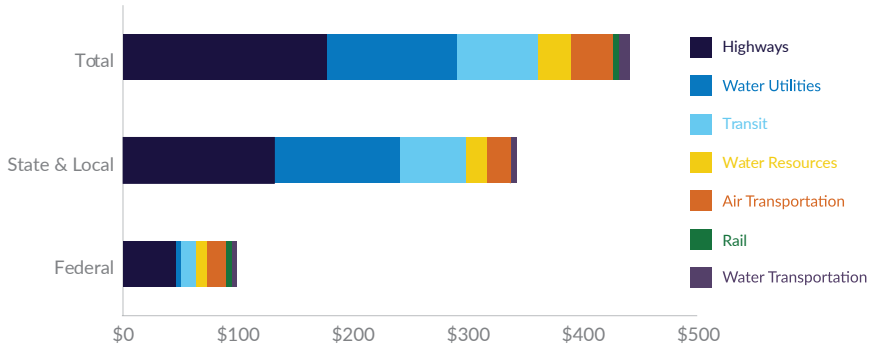
Note: *Infrastructure spending includes air and water transportation, highways, natural resources, parking, wastewater management, utilities, and transit.*

Federal, state, and local governments also have different infrastructure priorities. Although roads and utilities account for the majority of total infrastructure spending, the federal government spends the most significant proportion of its funds on highway construction, followed by air transportation and transit. And while state and local governments also spend the single largest portion of funds on highways, their contributions to utilities, transit, and other categories account for the majority of total public spending.

State and local spending are not homogenous, however. State infrastructure spending primarily reflects federal priorities, while local expenditure is more mixed. In 2017, the average local government dedicated more than half of infrastructure spending to utilities, followed by wastewater management/sanitation, highways, and transit. Local government spending patterns also vary by organizational structure; in some instances, city and county governments account for the majority of local government infrastructure spending on roads and solid waste management. Meanwhile, cities and special districts account for the majority of local expenditures in all other categories.[30]

Figure 4: Highways and Utilities Account for Most Infrastructure Spending

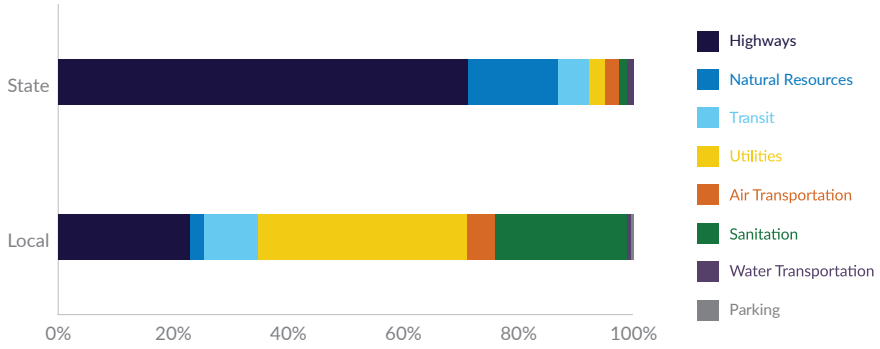
2017 Water and Transportation Spending by Category, Billions of Real 2017 Dollars



Source: *Congressional Budget Office (2018)*

Figure 5: State Infrastructure Spending Largely Reflects Federal Priorities

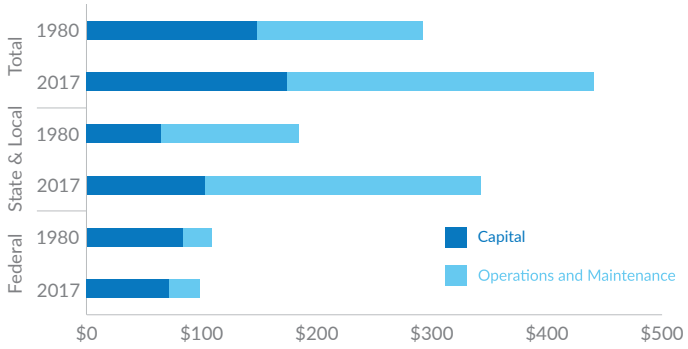
Average Share of Infrastructure Spending by Type and Government Level, 2017



Source: US Census Bureau Annual Survey of State and Local Governments (2019)

At the same time, real spending power has decreased in recent years due to the high cost of materials. Overall, real public infrastructure spending between 2007 and 2017 declined by $9.9 billion.[31] Total public-sector spending on infrastructure operation and maintenance now accounts for 60.5 percent of public infrastructure spending, compared to 50 percent in 1980. Federal spending leans more heavily toward capital investment, while state and local governments spend more on operations and maintenance.[32] When paired with the simultaneous decrease in capital project spending, these trends demonstrate that the US is spending much more money to maintain and functionally operate aging infrastructure rather than developing new systems.

Figure 6: Infrastructure Spending Largely Focused on Operations and Maintenance
Water and Transportation Spending by Use, Billions of Real 2017 Dollars



Source: *Congressional Budget Office (2018)*

2. Evidence of Disinvestment in the Built Environment

The American Society of Civil Engineers (ASCE) considers the overall infrastructure system to be in poor to fair condition. Core infrastructure—including its airports, bridges, dams, drinking water, energy, ports, roads, levees, rails, transit, among others— is "poor" and "at-risk" and received a "D+."[33] Condition and capacity are also of grave concern, with a large portion of the system exhibiting signs that it is approaching the end of its service life.[34]

Significant investment is required to update the system. The Department of Transportation (DOT) estimates that $800 billion is necessary to shore up the nation's roads and bridges. In contrast, the Environmental Protection Agency (EPA) estimates that drinking water, wastewater, and irrigation systems will require $632 billion in additional investment over the next decade. In total, the ASCE estimates the cost of bringing US core economic assets to a state of good repair by 2025 would cost $4.6 trillion. Failing to bring infrastructure up to standard has even more significant consequences: $3.9 trillion in lost GDP by 2025, $7 trillion in lost business sales, 2.5 million fewer American jobs by 2025, and an estimated loss of an average of $3,400 per year in disposable income for American families.[35]

The consequences of a failure to keep pace with infrastructure needs are readily apparent. The US has seen several extreme examples of inadequate infrastructure investment in recent years, including the failure of New Orleans' levees and the Flint water crisis.[36] However, updating and upgrading these critical assets will also require modernizing underlying infrastructure funding mechanisms, governance, and policy priorities and overcoming significant policy barriers.

IV.

POLICY BARRIERS

1. Federal Policy Barriers

FEDERAL POLICY BARRIER 1: LACK OF CONSISTENT FUNDING AND FINANCING SOURCES

The federal government invests in infrastructure through a variety of means, including direct spending, grants, loans, and tax preferences. It also supports the municipal bond market through tax incentives, which local governments use to finance infrastructure projects. While providing these incentives can make investment more appealing, foregone federal revenues due to bond financing exemptions for infrastructure projects average $30 billion annually.[37]

Historically, the primary mechanism for funding transportation infrastructure is the Highway Trust Fund (HTF), created in 1956 to raise money through a flat gas tax—last increased in 1993—and other transportation-related taxes. Approximately 80 percent of revenues are spent on roads and highways, and the remainder on mass transit projects. However, fuel efficiency advancements, increasing vehicle electrification, and inflation have decimated gas tax revenues and reduced gas tax purchasing power by 64 percent since 1993.[38] Without policy action, the HTF will run out of money as soon as 2021.[39]

Because program costs outweigh gas tax revenues, Congress has backfilled the HTF with general fund revenues since 2008. To avoid raising taxes in the recent Fixing America's Surface Transportation (FAST) Act, for instance, Congress used $70 billion in general fund revenues to offset a $14 billion annual shortfall.[40] Other existing programs also have their limitations. For example, the Transportation Infrastructure and Innovation Act (TIFIA) employs a federal aid matching strategy, providing low-interest loans and other credit assistance that local government can use to finance infrastructure projects. Through direct loans, loan guarantees, and standby lines of credit, TIFIA has provided nearly $32 billion in financing from its inception in 1998 until FY 2018.[41]

Despite its success, TIFIA restricts its credit program to surface transportation projects, particularly larger-scale highways and transit capital projects.[42] While a useful tool in leveraging a variety of funding sources, it does not replace grants and other financial support needed by states and local governments for smaller, regionally transformative projects. And where the FAST Act expanded eligibility for small and rural projects, especially transit-oriented development, these project types are often ineligible for TIFIA loans.[43]

FEDERAL POLICY BARRIER 2: INFRASTRUCTURE INVESTMENT IS RISKY AND UNCERTAIN

Developing infrastructure carries significant risk, including cost overruns, delays in construction, and failed procurements due to time delays and canceled contracts.[44] Infrastructure projects are expensive, and when combined with the risk element, private capital has mostly remained on the sidelines. Most infrastructure investment in the US has been capitalized and financed by the public sector, usually in cooperation across various levels of government. In many cases, a project's success depends on the certainty of cost estimates and partner funding commitments, and on receiving funding promptly.

Projects benefit when borrowers can depend on consistency over time and have confidence in a risk framework that clearly defines terms and loan decisions. In developing large-scale projects, certainty and timing are critical factors, especially when involving private investors. For sponsors to work effectively with government partners in the development, financing, and delivery of infrastructure projects, the potential costs associated with the uncertainty of loan terms, timing, and approval processes may outweigh the benefits these programs could otherwise provide.

The California High-Speed Rail project, for instance, promised to connect Los Angeles and San Francisco by 2028. Voters initially approved $9.95 billion in bonds for the construction of an 800-mile track at an initial cost of $40 billion. However, project costs have ballooned to $77.3 billion, primarily due to difficulties in land acquisition, local backlash over right-of-way acquisition, over-engineering in construction, and environmental litigation.[45]

The California High-Speed Rail Authority, the state agency tasked with developing and implementing the project, has sought to meet rising costs and fill the funding gap with federal support. In 2009, California secured $2.5 billion as a result of the American Recovery and Reinvestment Act and an additional $929 million the following year through a Transportation, Housing and Urban Development grant.[46] The State's Cap-and-Trade Program also provided supplemental project funding. However, the project has only secured about one-third of the total estimated costs over the last 10 years. And to maintain the conditions of federal funding, an approximately 119-mile stretch in the Central Valley must be finished, along with the environmental review, by 2022.[47]

However, in 2019, the Federal Railroad Administration under President Donald Trump announced the cancellation of its nearly billion-dollar funding contract with the state,[48] threatening to not only withdraw remaining federal funding but also demand repayment of funds spent. California's governor immediately responded with a lawsuit against the illegal breach of contract, delaying further progress. The large-scale transportation and infrastructure project must now secure full funding to retain viability and meet its delayed opening in 2033.

FEDERAL POLICY BARRIER 3: LACK OF POLICY COORDINATION AND PROJECT PRIORITIZATION

In facilitating efficient project planning, development, and delivery, a consistent challenge has been aligning projects with policy. The Clean Air Act of 1970, the Clean Water Act, the Coastal Zone Management Act of 1972, and other environmental laws imposed mandatory environmental standards but limited national capacity to develop infrastructure quickly.

For example, the National Environmental Policy Act (NEPA) of 1970 creates procedural restrictions requiring lengthy environmental reviews and environmental impact statements before project approval.[49] By responding to broader, general requirements rather than specific, substantive environmental quality mandates, projects undergoing NEPA review are particularly vulnerable to lawsuits that argue against the breadth of an agency's environmental analysis. Considering environmental impacts, though necessary, can hinder project development and provide an opportunity for political challengers to thwart potential infrastructure improvements.[50]

Additionally, the US lacks a robust federal framework to prioritize and coordinate projects. In contrast, several countries maintain an infrastructure pipeline to coordinate their infrastructure projects and direct finite resources effectively. A pipeline helps the private sector understand and invest in a centralized plan for a nation's growth. India's National Infrastructure Pipeline (NIP), announced in 2019, is a prime example.[51]

At the time of the announcement, India needed an estimated $4.5 trillion in infrastructure spending over the decade.[52] As such, India created the NIP to ensure the efficient use of resources. The pipeline evaluates infrastructure developments across India using a set of global standards and facilitates equity of access to infrastructure. The NIP consists of both public- and private-sector projects. Other countries with similar planning tools include New Zealand[53] and Australia.[54]

FEDERAL POLICY BARRIER 4: INFRASTRUCTURE POLICY PRIORITIES REFLECT 20TH-CENTURY NEEDS

As noted earlier, the federal government invests significantly in the nation's legacy infrastructure, but building new capabilities is largely an afterthought. As previously stated, transportation investment primarily takes the form of building and maintaining highways, a relic of building inter-state connectivity during the Cold War era. Infrastructure policy thus must evolve to meet the demands and challenges of the 21st century.

The most fundamental infrastructure need is resilience and climate adaptability. Climate-related disasters and environmental changes threaten to devastate entire communities and economies. Preparing for climate change will require a fundamental recalibration of current policy, much like the Clean Water Act and Safe Drinking Water Act changed the federal government's approach to water quality regulation.[55] The US needs new proactive investments to mitigate risk better and finance green, resilient infrastructure designs and technology, emphasizing environmental and economic returns while preventing the ecological and financial tolls of its current reactive approach.

A proactive approach to resilience must also emphasize alternative modes of transportation. As noted by the EPA, the automobile-dominated transportation sector represents 29 percent of total national greenhouse emissions.[56] Additionally, the continual conversion of rural lands into urban and suburban development will only increase stormwater runoff, fuel consumption, loss of tree cover, wetlands, and other natural resources.

Density, especially regarding housing and transit, is also necessary to reduce carbon emissions and mitigate climate impacts. By some estimates, a mix of increased density and transit could cut emissions in cities globally by a third.[57] By supporting pro-density policies, especially building housing along transit corridors and in proximity to job centers, federal frameworks can reduce carbon emissions and promote equitable access to economic opportunity.

Lastly, the US must also update its infrastructure policy to provide reliable broadband internet access. Americans have experienced a breakneck digitalization of life in the 21st century, including access to education, jobs, public services, and personal relationships. Current telecommunication policy frameworks, however, primarily focus on telephone lines and television infrastructure.

Those without consistent internet access, however, are at an immediate disadvantage when it comes to education, employment, and accessing services. According to the Federal Communications Commission,[58] 21.3 million people in the United States still did not have broadband internet access in 2019, and other reports suggested the real figure could be twice that high.[59] The current pandemic has only exacerbated this deficit. Students participate in their education entirely online, and many people are turning to online services for some, if not all, of their essential needs: making doctors' appointments, going to work, ordering food, and receiving medications.

Although the federal government supports grants for broadband deployment in rural communities, these projects comprise a small portion of total investment in the sector. Telecommunications spending mainly comes from private companies, and most relevant systems and networks are privately owned.[60] To build competitiveness and equity, the US must update its national infrastructure to ensure equitable internet access and digital literacy, and to support rural and metropolitan neighborhoods experiencing digital disadvantage, especially at this crucial moment in time.[61]

2. State and Local Policy Barriers

At a state and local level, systemic challenges to building infrastructure are often a direct consequence of reduced federal involvement. Even so, the long-term, functional maintenance of core assets by state and local governments remains a priority, given that they own 93 percent of public infrastructure assets.[62] While infrastructure payment and financing specifics vary by state, the following section highlights high-level challenges generally common across the US.

STATE POLICY BARRIER 1: "PAY-AS-YOU-GO" FINANCING IS VULNERABLE TO THE BUSINESS CYCLE

A majority of states pay for infrastructure investments with a mix of debt, usually in the form of government-issued bonds, user fees (such as tolls), federal grants, and taxes (especially fuel taxes). However, almost half of states eschew debt or don't issue bonds for infrastructure or other spending categories. Instead, these states primarily rely on cash on hand from taxes, fees, grants, or other sources to pay for capital projects, a practice called "pay-as-you-go" financing.[63]

States that practice pay-as-you-go favor using general fund revenues to pay for infrastructure,[64] denying infrastructural investments a stable, predictable flow of funds.[65] Funding infrastructure out of general fund revenues means infrastructure must compete with other programs for budget dollars each year. Moreover, downturns in the business cycle, in which tax dollars tend to decline, make funding difficulties more acute. Debt, usually from general obligation or infrastructure bonds, tends to keep investments more stable over the business cycle.[66]

Taxes and user fees—for instance, gas taxes, roadway tolls, water and sewer fees, and facility entry fees—form the most considerable portion of state funding sources for infrastructure projects.[67] In 2017, for instance, state and local motor fuel tax revenues accounted for 26 percent of state and local highway and road spending, while highway toll revenues generated another 10 percent.[68]

However, as mentioned previously, relying on gas taxes to fund transportation infrastructure is increasingly untenable due to fuel price volatility, better fuel efficiency standards, the increasing prevalence of electric vehicles, and a failure to keep up with inflation.[69] Moreover, both fuel sales and vehicle miles traveled (VMT) fall during recessions, further highlighting the challenges of funding infrastructure through user fees or taxes.[70]

Some states have established state infrastructure banks (SIBs) to provide additional financing and technical assistance support. SIBs, supported by the US Department of Transportation, are public lending agencies that provide private bank functions, encouraging investment in transportation and water projects through revolving loan funds. Although state infrastructure banks gave roughly $9 billion per year in financing for water and transportation, the majority of their capital comes from federal grants, further highlighting a lack of self-financed activity.[71]

STATE POLICY BARRIER 2: REGIONAL AND STATE SILOS INHIBIT INFRASTRUCTURE DEVELOPMENT

In 2019, almost half of US mayors highlighted infrastructure as the single biggest urban issue they hoped would receive election attention.[72] A 2016 survey of local governments also found that only 13 percent of respondents believed that the current state of their jurisdiction's infrastructure met community needs and that an adequate level of funding was available.[73] These statistics highlight how land use and infrastructure development decisions at the local level shape infrastructure policy.

But although the effects of policy are felt in towns, cities, and counties, infrastructure programs developed decades ago are siloed from their government agencies. Local agencies often need to approach multiple regional and state government offices for infrastructure funding and guidance. Local agencies may also lack the technical expertise and capacity to build out large infrastructure

projects or packages, like public-private partnerships. And while SIBs do provide technical assistance, these institutions are not available in all states and often lack a regional presence.

New forms of technical assistance are thus necessary to strengthen local capacity and coordinate funding for optimal land use and infrastructure investment. There is potential for state governments to play a role in prioritizing projects, facilitating access to capital, and helping to create financial and political leverage. States can also help strengthen local technical capacity, push policy outcomes, and coordinate funding.

STATE POLICY BARRIER 3: STATE POLICY CAN FURTHER DELAY PROJECTS

Infrastructure planning, development, rehabilitation, and environmental impact are inevitably linked. Environmental reviews are among the main sources of delays. While federal agencies spend, on average, four-and-a-half years or more completing environmental impact statements under the National Environmental Policy Act,[74] multiple states have laws equivalent to NEPA,[75] further prolonging the lengthy environmental review processes for infrastructure projects.

The California Environmental Quality Act (CEQA), for instance, is notorious among developers as a means for NIMBY (not-in-my-backyard) and other anti-growth groups to derail projects. Signed into state law in 1970 by Governor Ronald Reagan, CEQA supplemented NEPA with stricter state guidelines. The law requires the state's public agencies to evaluate and minimize potential environmental impacts of development and land use-related projects, including public projects, private developments, and even community plans. Negative declarations or environmental impact reports requiring lengthy analysis, documentation, and reporting are typical for larger-scale projects. Local governments release these reports for public review and comment before preparing a final report for approval.[76]

Public agencies are responsible for CEQA compliance, and "its provisions are enforced, as necessary, by the public through litigation and the threat thereof."[77] In other words, anyone with an opinion—environmental or otherwise—can block or delay a project with legal challenges. CEQA litigation trends reflect the disconnect between environmental and infrastructure policy goals. In an analysis of all state CEQA lawsuit filings between 2010 and 2012, projects designed to advance environmental policy objectives were the most frequently challenged. Transit was the most targeted among infrastructure projects, while higher density housing was the most commonly challenged private-sector project.[78]

Legislation can result in unintended consequences beyond the original intent. CEQA, for instance, evolved from forward-thinking environmental regulation to derailing environmentally friendly projects, resulting in costly delays and litigation. And as the time to build sustainable infrastructure projects grows, so do costs.

States must examine how their various regulatory frameworks interact with and inhibit timely infrastructure development.

By aligning infrastructure priorities with environmental and regulatory priorities, state governments can layer resources more efficiently and allocate funding towards projects with improved shared outcomes. Streamlining processes for projects that address a broader range of state priorities can also ensure quick turnaround times and potentially transformative community impacts.

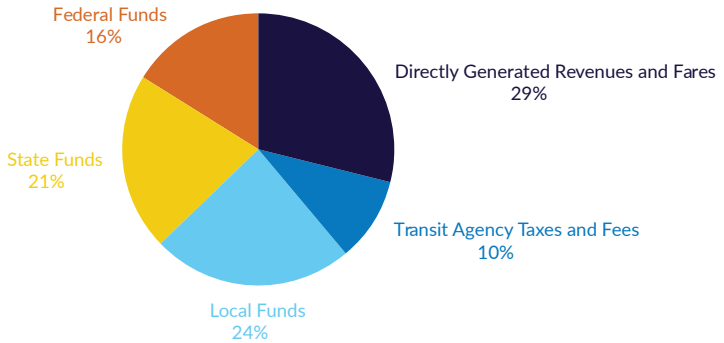
LOCAL POLICY BARRIER 1: AGENCIES MAINTAIN INFRASTRUCTURE WITHOUT LONG-TERM RESOURCES

Between declining federal investment, competition for general fund revenues, and falling revenues from state sources, local governments have no recourse other than to bear the responsibility of infrastructure maintenance themselves. To fill these gaps, local governments are turning to several sources, including local general taxes, dedicated user fees or taxes, financing districts, public-private partnerships (P3s), or some combination.[79] These alternative sources of local revenues are playing an increased role in infrastructure provision in the short- and medium-term.

An analysis of metropolitan transit authorities' (MTAs)[80] income sources is illustrative. In 2018, directly generated revenues, including income earned from fares, advertising, parking, and concessions, formed MTAs' largest source of income. But local funds, the second-largest source, comprised nearly a quarter of total revenues. These include general fund revenues; fuel, sales, and property taxes; and local option taxes. Local option taxes, which vary within a state, are controlled at the local or regional level and often earmarked for infrastructure-related purposes.[81]

Figure 7: Local and Directly Generated Revenue Sources Provide the Most Funds

Revenue Sources as Percent of Total Revenues, Metro Transit Authorities, 2018



Source: *National Transit Database (2018)*

In Los Angeles County, for instance, voters approved four half-cent option sales tax measures of varying duration—Propositions A and C and Measures R and M—dedicated to funding the regional transit authority. These taxes flow directly to the Los Angeles County Metropolitan Transit Authority, where they can also serve as bond financing leverage. As such, local sales taxes composed roughly half of all agency revenues in 2018.[82] LA Metro's experience is in no way the exception; cities in at least 20 states have dedicated portions of local option sales taxes for infrastructure.[83]

Although not captured in this dataset, local agencies are turning to novel means of infrastructure provision. These include public-private partnerships, assessment districts, and tax increment financing districts (TIFS), among others. But while these tools are extremely useful in the hands of local agencies, they are not without their challenges. Public-private partnerships, for instance, are authorized in 37 of 50 states but require significant time and technical, financial, and legal expertise to organize. Moreover, states might only permit P3s for a specific type of project.[84] And TIFs, allowed in nearly all 50 states, require foregoing future tax revenues to fund improvements in the built environment, leaving local governments with fewer revenues in the future.

Meanwhile, local option taxes also do not charge all users of newly funded infrastructure equally. Users in neighboring localities, for instance, may benefit from renewed infrastructure like roads or rail while not paying taxes. Local option taxes can also be regressive toward lower-income users, who are likely to pay a larger share of their income toward said taxes. These option taxes are often temporary and are hard-hit by recessions when consumer spending is down, making it difficult to rely on them in the long run.

Local agencies, strapped for resources, are coping with a lack of infrastructure funding through creative means. In the long run, however, these resources are not self-sustaining and will require either renewal or a completely new arrangement. Further, using general funds and other budget sources for infrastructure means having fewer revenues for other programs and purposes. Barring federal or state action, then, local agencies will need to find self-renewing, dependable sources of revenue for infrastructure.

V.

ACCELERATING INFRASTRUCTURE INVESTMENT

Rebuilding America's critical resources will require concerted effort at various governance levels. In the following pages, we present policy actions for federal, state, and local governments to begin the essential work of reconstruction and restoration. These recommendations, drawn from extensive research and conversations with Milken Institute stakeholders, are not exhaustive but present the beginnings of 21st-century infrastructure policy.

1. Federal Roadmap

FEDERAL SOLUTION 1: AUTHORIZE LONGER-TERM SURFACE TRANSPORTATION FUNDING AND ENSURE LONG-TERM HIGHWAY TRUST FUND SOLVENCY

Surface transportation infrastructure funding is subject to the whims of Congressional approval and is usually meted out for five- or six-year periods. Building infrastructure takes more than five or six years, though, making federal funding uncertain. As a first step, Congress should authorize longer-term surface transportation funding, which will enhance the ability of regional and local transportation agencies to plan, fund, and build projects.

Surface transportation legislation should also include priority funding for intermodal transportation, including monies for public transit and its associated operating costs, regional rail, and high-speed rail. The US has continued to prioritize road building, adding roughly 24 times as many new roadway miles as improved transit miles between 2010 and 2019,[85] and therefore must step up

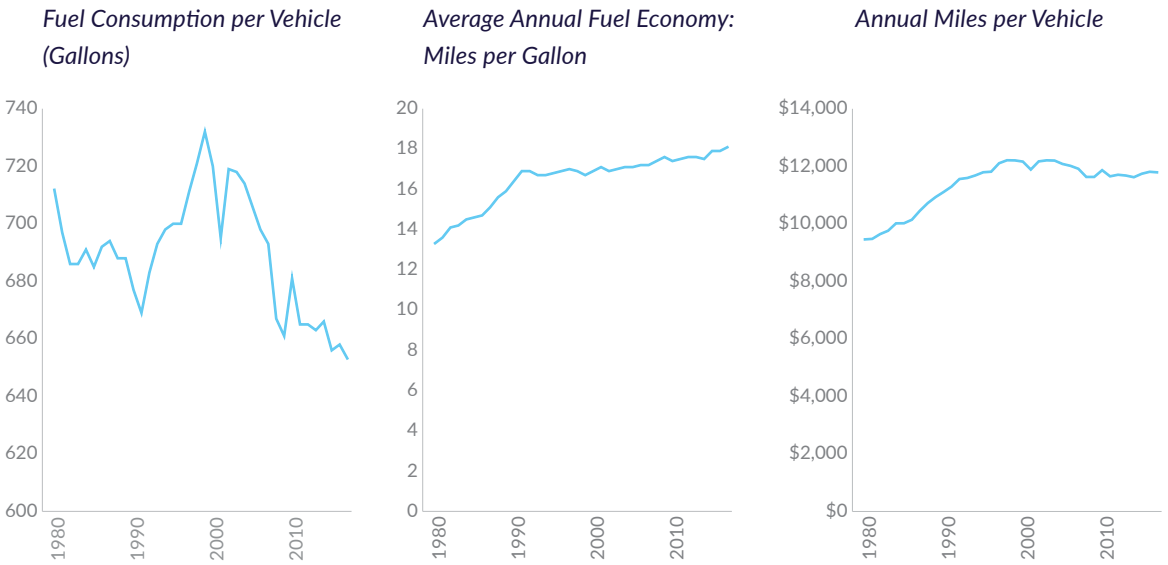
investment in public transportation to meet the climate imperative. As previously stated in this paper, transit agencies cannot currently self-finance with their revenues, making federal support for operating costs crucial.

Congress must also ensure long-term Highway Trust Fund solvency. The most straightforward proposal is to raise the gas tax by 25 cents over five years (a nickel a year), which would provide an additional $372.5 billion.[86] This option, although feasible in the near-term, is short-sighted. As mentioned earlier, gas taxes are vulnerable to recessions and continue to fall due to higher fuel efficiency standards. Longer-term options include:

- indexing the motor fuel tax with inflation to maintain purchasing power,
- a shift to user fees priced by vehicle miles traveled, or
- using congestion pricing and high occupancy vehicle fees.

Of these options, funding the Highway Trust Fund through a VMT fee most accurately prices end-users of roads and highways and outperforms the gas tax on "efficiency, distributional, and political grounds," even if vehicle miles traveled also falls during recessions.[87] One possibility is to implement VMT solely on commercial vehicles on all public roads at 7.5 cents per mile, which would be enough to replace current gas tax revenues and fill shortfalls.[88] And while implementing a VMT user fee will require capital investment to install modern tolling, the Brookings Institution notes that the increased data monitoring required for coronavirus response presents an opportunity to implement the digital tracking for road pricing.[89]

Figure 8: Vehicle Miles Traveled Are a More Stable Basis for User Fees



Source: *US Energy Information Administration (2020)*

NEXT STEPS

FOR THE FEDERAL GOVERNMENT

Expand VMT pilots by:

- **developing guidelines for a request for proposals (RFP) or incentive grant award, and**
- **soliciting MTAs or other state and local providers to conduct pilots that evaluate the effectiveness of VMT user fees.**

Use the RFP or grant to prioritize funding towards proposals that clearly define potential improvement in financial and environmental outcomes.

Include longer-term timeframes and prioritize investment in intermodal transportation in future surface reauthorization bills.

The Role of Freight Transportation in Infrastructure Maintenance

In light of the long-standing structural deficiencies in HTF funding, additional sources of revenues would prove valuable to ensuring its long-term financial stability. Restructuring how the freight transportation system pays for infrastructure, for instance, would provide an opportunity to raise and induce more sustainable forms of freight transportation. As of 2015, trucking is the single largest freight-shipping mode—by both value and volume—and is expected to account for 54.4 percent of all freight ton-miles by 2040. Freight trucking, however, incurs elevated costs relative to other modes of transportation. Each ton-mile of freight transported by truck, for instance, releases more than 10 times the number of greenhouse gas emissions and pavement damage of rail freight.

Implementing a vehicle fee based on both miles driven and vehicle weight would price sources of infrastructure damage more accurately. A list of potential tax options includes implementing taxes based on shipment weight, increasing diesel fuel taxes, implementing a tax on the transport of shipping containers, or increasing the existing tax on truck tires. This type of tax at the federal or state level would also help induce a switch to rail freight transportation.

FEDERAL SOLUTION 2: EXPAND CREDIT ENHANCEMENT TOOLS TO MITIGATE RISK AND INCENTIVIZE DEVELOPMENT PARTNERSHIPS

The federal government alone is uniquely capable of mitigating risk and stimulating private development partnerships by providing a foundation for investment. To attract more private capital, the federal government should expand existing credit enhancement tools, including the Transportation Infrastructure Finance and Innovation Act (TIFIA) and the Water Infrastructure Finance and Innovation Act (WIFIA) programs. These credit enhancement programs—loan guarantees, lines of credit, and contract assurances, to name a few—vastly expand the capital available for infrastructure projects at extremely cost-effective rates.

TIFIA, for instance, generates $14 in credit assistance for every $1 of budget authority, and each $14 of credit can leverage up to $42 in total infrastructure investment.[90] Loan recipients have noted that the better terms and low-interest rates help avoid delays and keep costs low. Federal action should expand the types of projects eligible for credit enhancement and increase the amount of funding for existing credit enhancement programs. Credit enhancement programs should also allow alternatives to credit agency ratings, like using cash flows or collateral, which will expand program access to rural and small communities.[91]

NEXT STEPS

FOR THE FEDERAL GOVERNMENT

- **Amend and expand project eligibility criteria under the TIFIA statute:**
  - **Include other types of infrastructure outside of surface transportation.**
  - **Consider the transformative impact of funding smaller-scale projects.**
- **Amend and expand project eligibility criteria under the WIFIA statute:**
  - **Include other types of non-federal flood mitigation, navigation, and water supply not currently authorized under the EPA (e.g., storm damage reduction, brownfield remediation).**
- **Remove classification restrictions that prevent water facilities from receiving funding support.**

FEDERAL SOLUTION 3: ESTABLISH A PREDEVELOPMENT CAPITAL FUND AND ALIGN FEDERAL INCENTIVES

Currently, there is no single set of standards by which to evaluate the quality or economic and equity impacts of infrastructure projects. To expand 21st-century infrastructure effectively and maximize the use of limited resources, federal leaders must define the criteria for investment-worthy projects and incentivize the types of projects that they want to see.

First, we recommend the creation of a $10 billion federal infrastructure predevelopment fund to accelerate infrastructure development.[92] Predevelopment funds typically pay for tasks that must be completed before project construction—for instance, engineering work, site acquisition, and permitting—but is difficult to obtain. Access to predevelopment capital funds, however, would require a commitment to resiliency, international performance standards, a plan to address lifecycle costs, and improving access for underserved communities (see federal solution 4). Federal requirements should also include sufficient data tracking and accountability frameworks. Currently, US infrastructure procurement at all levels values low-cost bids over long-term planning. But by requiring projects to develop maintenance plans for the full life of infrastructure assets, we can begin to meaningfully close our $4 trillion infrastructure gap and facilitate a steady stream of shovel-ready and job-creating projects at the state and local level.[93]

Predevelopment capital should be deployed through 10 regional resilience centers to promote collaboration across agencies and share best practices in procurement, predevelopment, permitting, and asset management. Additionally, these centers would cut across geographies, coordinate shared databases, and provide critical technical assistance for local governments developing infrastructure projects. The federal government can also offer additional financial incentives on top of tax-deferred capital gains, streamlined environmental reviews, or permitting for infrastructure projects of specific types.

Federal guidelines should also organize existing tax incentives to stimulate infrastructure development with private-sector partners. For instance, the Opportunity

Zones (OZs) program is a tax policy tool to defer or eliminate capital gains taxes through geographically targeted investment in distressed neighborhoods. While OZs are an essential part of the federal financial toolkit, state and local governments are primarily responsible for matching OZ program guidelines with policy priorities. The federal government can issue guidelines promoting and detailing the use of Opportunity Zones for local infrastructure development and incentivize the use of predevelopment grants to help communities learn to access OZ investments more effectively.

Congress should also revive low-cost debt finance tools used during the 2008 Recession—including Build America Bonds and Private Activity Bonds—and restructure the programs and methods it uses to provide states and local governments with community development funding. Block grants, including the Community Development Block Grant and Disaster Relief Block Grants, provide flexible funding for many community development efforts. A new, dedicated block grant specifically for infrastructure projects can provide funding matched to local gaps, needed system improvements, and deficiencies (e.g., mobility, resilience, broadband, etc.). Additionally, in light of the current coronavirus economic disaster, a one-time appropriation or dedicated block grant (e.g., CDBG-DR) would allow local governments to induce capital improvements of needed infrastructure.

NEXT STEPS

FOR THE FEDERAL GOVERNMENT

- **Establish a $10 billion predevelopment capital fund and regional resilience centers to coordinate fund disbursement.**
- **Align projects that meet criteria with existing or new federal programs that offer incentives, funding support, or technical assistance.**
- **Expand the use of the Federal Block Grant Program to provide a dedicated infrastructure-funding source applied at the local level.**

Best Practices for Public-Private Partnerships

Key Takeaway: Public-private partnerships (P3s) offer the possibility of infrastructure delivery at a lower cost to the public and quicker time. To reach their full potential, P3s need coordination, innovative mixes and sources of financing, and access to predevelopment capital.

P3s involve collaboration between a private entity (such as a corporation) and a government agency to finance, build, and maintain large projects.[94] P3s are particularly popular in cases where the government agency may not have the financial capacity or expertise to execute a project effectively. Most P3s involve long-term contracts, sometimes covering the life of the project, and as such, P3 arrangements are structured to provide stability to both parties.[95] The private actor will often provide performance guarantees to protect the public if the product or service isn't delivered. In some P3 arrangements, user fees pay for services, while in others, the cost of service is borne partially or entirely by the government. In both cases, the private sector provides capital investment.

P3s can be a wise choice when the government (usually state or local) lacks the capital or expertise to get a significant project off the ground, as this type of arrangement allows the public entity to avoid going into debt. Private debt or investment would instead provide project funding in exchange for other benefits—tax breaks, in-kind contributions, or one-off grants—which make the project economically viable. An arrangement of this type allows the public to harness the efficiencies and expertise of the private sector.

But while the number of public-private-partnerships in procurement has increased significantly since 2015, P3s are less frequently used in the United States compared to Europe or Canada.[96] One reason is that the United States lacks centralization for infrastructure delivery, especially P3 projects, which would also allow for technical expertise to be shared. In Canada, for instance, the Canadian Council for Public-Private Partnerships (CCPPP) facilitates collaboration among government, indigenous communities, and the private sector to enable innovative and sustainable approaches to developing and maintaining public infrastructure. The CCPPP also engages with community stakeholders, the private sector, and municipal governments to promote best practices and explain the technical components of P3s. Additionally, the CCPPP maintains a database of infrastructure projects ready for funding to match private capital to public-sector projects.[97]

Public-private-partnerships should also cut across silos and match government funding with private-sector financing sources to deliver lower-cost infrastructure projects. In Denver, for example, the Regional Transportation District (RTD) entered into a public-private partnership with Denver Transit Partners for a $2.2 billion expansion of the region's commuter rail infrastructure. The Eagle P3—the first transit P3 in the nation—was delivered $300 million below internal cost estimates and will be fully operated by the private-sector partner for 29 years after construction.[98]

The Eagle P3 has been as a standout model of infrastructure delivery, and project leaders credit its success to a focus on performance standards, access to predevelopment capital to the tune of $2.5 million, a competitive bid environment, and an innovative financing mix.[99] The project mixed public and private financing mechanisms, including a $1.03 billion full funding agreement from the Federal Transit Authority, $128 million in dedicated local sales taxes, $280 million in TIFIA loans, and $396 million in Private Activity Bonds.[100]

FEDERAL SOLUTION 4: PRIORITIZE PROJECTS ADDRESSING UNEQUAL ACCESS TO PUBLIC SERVICES

Many low-income communities, communities of color, and rural communities are under-resourced, whether they lack transportation options or access to high-speed broadband internet, or they face adverse health effects from inadequate infrastructure. Any new legislation authorizing infrastructure spending must prioritize projects that directly address inequalities and historical under-investment in the built environment.

A new infrastructure package should set aside specific funds to:

- remediate water infrastructure, especially in Black, Native American, and rural communities;
- finance infrastructure improvements to reduce lead, water, air, and hazardous waste contamination in low-income communities, communities of color, and rural communities;
- build transportation investments, especially public transit, in neighborhoods cut off from jobs and education; and
- provide access to high-speed broadband access through the construction of broadband infrastructure or open access points.

These projects require public spending because investments in higher-income and more developed communities tend to bring higher financial returns. Therefore, private capital has an incentive to meet these needs. Federal funding's role is to fill the gaps where private money will not go.[101]

NEXT STEPS

FOR THE FEDERAL GOVERNMENT

Establish benchmarking criteria for prioritizing shovel-ready projects based on equity and critical gaps. Potential options include:

- **census tracts with a high percentage of low-income workers who rely on public transit for work and have long commutes (more than 60 minutes one way),**
- **census tracts with a high percentage of poorly performing infrastructure (for instance, inadequate plumbing, wastewater issues, etc.), and**
- **direct investments to formerly "high-risk" neighborhoods (using redlining maps).**

FEDERAL SOLUTION 5: PASS COMPREHENSIVE BROADBAND LEGISLATION

Millions of households lack access to high-speed wireline or wireless services, and even more lack the skills to use digital services designed to enable economic stability, education, social supports, and civic agency.[102] Higher levels of broadband adoption also positively impact income growth and reduce unemployment. Conversely, low levels of broadband adoption can lead to fewer businesses and lower employment overall.[103] These broadband deficiencies are particularly visible in urban communities of color and in rural areas, where social, economic, and geographic contexts tend to determine broadband adoption rates.[104]

Beyond the Communications Act of 1934 and the Telecommunications Act of 1996, which centered on phone and television service, the US has not passed comprehensive communications legislation.[105] As policymakers move forward with the debate on how to finance new infrastructure investments, they must ensure that any infrastructure framework addresses the deficit in broadband architecture.

Broadband architecture is most deficient in rural markets. While several other federal programs exist to support connectivity in rural areas, mutually exclusive program eligibility and guidelines may prevent money from reaching the places that need it most. As such, Congress should restructure federal aid programs, clearly defining terms of eligibility, benefits, services, and outcomes to not only prevent program funding overlap but also evaluate the effectiveness of program support.

Additionally, members of Congress have recently pushed the FCC to use E-Rate funding to extend networks from schools to students working at home.[106] E-Rate is an FCC program that provides support for improved Internet access in schools and libraries. However, due to language in the federal Communications Act, available E-Rate funding is prohibited from being used for students' home use. The FCC's Wireline Competition Bureau has since issued a waiver[107] for E-Rate program applicants, as well as Rural Health Care program applicants, to receive additional support from vendors.[108]

But with the FCC waiver effective only through September 30, 2020, updated broadband infrastructure policies must be developed and implemented on a federal level to bridge the digital divide. Congress should authorize the FCC to subsidize home use of wireless devices and connection services by expanding E-Rate coverage to support more than school classroom connectivity.

Currently, local governments are pursuing innovative solutions to the provision of internet infrastructure. For example, a P3 arrangement between the City of Sacramento and Verizon will upgrade the city's smart technology, offering free Wi-Fi in public parks, digital kiosks, and science, technology, engineering, and mathematics education initiatives.[109] The federal government can encourage more municipal broadband programs through an incentive system, which will

require funding support to cities that lack access to viable private-sector partners. Although federal efforts highlight a growing consensus that broadband is an essential right, much of our national infrastructure policy and programs must be updated to ensure equitable access to broadband development and deployment.

NEXT STEPS

FOR THE FEDERAL GOVERNMENT

- **Emphasize providing connectivity, especially to disconnected areas, through functionally effective and reliable methods (fiber, cable, and fixed wireless services, not DSL, satellite).**
- **Ensure Congress authorizes the FCC to subsidize home use of devices and connection services by expanding E-Rate program fund coverage to support not only school classroom connectivity but also home classroom connectivity, including the use of wireless devices and services.**
- **Establish federal incentives or matching programs in support of Broadband P3.**

2. State and Local Roadmap

STATE SOLUTION 1: BUNDLE SMALL PROJECTS TO ATTRACT INTEREST FROM CAPITAL MARKETS

Long-term institutional investors and private investors are not attracted to small-scale projects. The sheer cost of customer work and project analysis for infrastructure development makes small project margins unprofitable. For due diligence and transaction costs to be worth the effort, the private sector is primarily interested in projects in the $100 million range. In contrast, the average municipal project ranges from $25 million to 50 million.[110]

To attract outside capital and additional long-term funding, states should bundle small projects into larger packages. Bundling of similar types of infrastructure assets, including bridges, roads, or water infrastructure, can save on design and construction costs by standardizing permitting, design, and material purchases across multiple projects. Construction materials can also be purchased in bulk, resulting in further cost savings and proposals of an investable size that justify due diligence costs for private investors.[111] Bundling also attracts institutional capital—pension fund investors, insurance funds, and endowments—and spreads the risk over multiple projects.

The most crucial factor in successfully bundling projects is a single government counterparty that is legally authorized to act on behalf of all participating agencies.

State governments are well-suited for this counterparty role because they understand the specific needs of their localities and have the technical capacity to negotiate and structure P3 deals. Additionally, bundled projects must be a manageable size, big enough to attract private investment and reduce capital costs, but also not so large that the project is unmanageable. Geography is another important consideration. If bundled assets are in different locations, they should be close enough to share equipment, workers, and other resources, which will improve efficiency.[112]

Some states are already bundling projects to repair existing assets (see case study). Their experiences demonstrate that asset bundling need not conflict with small business and subcontracting requirements. In Pennsylvania's case, the selected team maintains offices in the state and features 11 Pennsylvania-based subcontractors.[113] While bundling bridges has resulted in significant cost savings, the subcontracting process allowed room for the continued involvement of local small businesses in building state investments.

NEXT STEPS

FOR STATE GOVERNMENTS

- **Task state agencies in charge of infrastructure provision to determine which assets and projects with similar challenges and designs can be bundled.**
- **Explore capital markets solutions and financial solutions that local and state leaders can leverage and align with tax and other incentives.**

Case Study: Project Bundling

Key Takeaway: Project bundling may enable lower-cost, higher efficiency infrastructure development but requires similarity on some level, whether that is assets, geography, or other challenges. Examples of each may be found across the US and Canada.

West Coast Infrastructure Exchange

The West Coast Infrastructure Exchange (WCX) is a multi-state partnership among California, Oregon, Washington, and the Province of British Columbia. The organization, founded in 2012, develops performance-based standards for infrastructure projects, promotes cooperation and shared technical expertise among local government agencies, and identifies opportunities to match institutional and private capital to scaled, regional, publicly owned infrastructure projects.[114] To do so, the WCX facilitates project bundling across local jurisdictions into a single, long-term project. In one example, the WCX explored aggregating small drinking and wastewater projects into one project. This consolidation would require developing standardized criteria for aggregation eligibility, the creation of a singular entity with authority to negotiate and contract on behalf of all participating jurisdictions, and, most critically, local stakeholder support.[115]

Bundling in Canadian Provinces

Our neighbors to the north have more experience bundling smaller projects to attract private investment. For example, the province of Saskatchewan built 18 elementary schools in two years, saving an estimated CAD 100 million and employing 2,300 workers.[116] By bundling the schools, the regional government leveraged outside investment and began construction faster than was possible through the standard budget process. The bundled P3 model also facilitated a more transparent, predictable budget compared to traditional procurement.[117] Alberta also used a series of public-private bundling projects to build 40 schools between 2010 and 2014.[118]

Bridge Bundling

According to the Federal Highway Administration, several states have used project bundling to rehabilitate and rebuild bridges. Pennsylvania's Department of Transportation (PennDOT) used asset bundling to repair county-owned bridges in poor condition, replacing 41 county-owned bridges for $25 million, a 25-50 percent cost savings on design, and 5-15 percent savings on construction. Following this successful pilot, PennDOT then bundled 588 bridges across the state.[119] Similarly, South Carolina's Department of Transportation aggregated and replaced 28 poor-quality bridges for $84.5 million. By establishing a team to manage its bundled projects, the state DOT has saved time and money on infrastructure maintenance.[120]

STATE SOLUTION 2: ADOPT A REGIONAL ECONOMIC FRAMEWORK FOR INFRASTRUCTURE PROVISION

State agencies overseeing infrastructure investment are more than providers of services. The provision of infrastructure can catalyze economic development and the growth of new industries. These public agencies, such as the Tennessee Valley Authority (see case study), can function as sites of targeted regional collaboration, technical assistance provision, and workforce development coordination.

Targeted Regional Collaboration

As with the Tennessee Valley Authority, state governments should collaborate with sub-state level public agencies to align investments in the built environment. One possibility is to create regional economic development offices (as an extension of the state economic development office) to coordinate funding and drive state policy outcomes. These regionally focused, state-level agencies can directly distribute state dollars to significant projects. State governments will also gain a robust understanding of development challenges and priorities at the local level through collaboration with local governments, which will also enable them to route federal and state dollars effectively and maximize their impact. Additionally, states can leverage this new regional knowledge to build a 10-year infrastructure investment plan and promote long-term, integrated, multi-modal planning—given that transportation networks often span cities and counties—and an outcomes mindset for future infrastructure purchases.[121]

Providing Technical Assistance

Local agencies often lack the technical and financial expertise to structure infrastructure development deals, public-private partnerships, and other sophisticated financing mechanisms on their own. Through regional offices, state governments can create points of connection with local agencies to offer technical assistance, enabling public servants and city managers to use a full breadth of resources and calculate project-level infrastructure funding. State governments can also establish and enforce common standards, procedures, performance metrics, and data collection systems for infrastructure through these collaborations, which will allow them to assess investment effectiveness.

Coordinating Workforce Investments

A low supply of skilled infrastructure workers impedes needed investments in the built environment. This worker shortage—especially among highly specialized and technical workers, like maintenance specialists, rail signal inspectors, and power inspectors—drives up the price of projects. Regional program offices can leverage state dollars to develop local talent through workforce training and community development programs. States can also provide specialized workforce training linked to specific projects and industry partners.

NEXT STEPS

FOR STATE GOVERNMENTS

- **Create a Regional Infrastructure Task Force of state and local infrastructure experts, reporting to the governor and in partnership with state economic development offices, to serve as an advisory clearinghouse for non-federal infrastructure projects:**
  - **to advise on project lifecycle support and**
  - **to direct resources and provide technical assistance in deal structure and project development.**
- **Align projects with regional partners in procurement and workforce provision.**

Case Study: The Tennessee Valley Authority

Key Takeaway: Public agencies building and maintaining infrastructure have the power to accelerate industrial growth, improve local livelihoods, and attract outside economic development.

The benefits of infrastructure investment extend beyond the monetary value of investments in the built environment. Building infrastructure can accelerate economic and industrial growth dramatically, attract businesses, and incentivize development, as is the case with the Tennessee Valley Authority (TVA), a regional economic development agency and federally owned electric utility. While created by a federal program, the TVA offers lessons in regional development and coordination applicable at the state and local levels.

In the early 1930s, the Tennessee Valley, a region spanning seven southern states and 80,000 square miles, was among the poorest, least developed regions in the nation. Counties in the Tennessee Valley had less access to electricity, were less urbanized, and had lower literacy rates compared to the rest of the country. In addition, the regional economy was mostly agriculture-dependent at a time when manufacturing activity was expanding across the US.[122]

Franklin D. Roosevelt tasked The Tennessee Valley Authority, a creation of the Tennessee Valley Authority Act of 1933, to modernize the Tennessee Valley. Its responsibilities included making the Tennessee River (which had been prone to periodic flooding) easier to navigate, reforesting and preserving land, developing agriculture and industry, and operating the hydroelectric Wilson Dam at Muscle Shoals.[123]

Among its accomplishments, the TVA built dams and reservoirs for flood control and navigation, a 650-mile navigation canal, a road network, and an electric network, and, by 1934, employed more than 9,000 people.[124] The TVA also succeeded in bringing electricity to the Tennessee Valley, mitigating floods and malaria, attracting businesses to the region, and improving land productivity by teaching farmers new techniques to control soil erosion.[125]

Although the TVA stopped receiving direct congressional funding in 1959, the resulting economic benefits lasted long after. The TVA significantly accelerated industrialization and manufacturing job growth in the region, and manufacturing employment continued to grow from 1960 to 2000 despite an absence of federal funds. Moreover, because manufacturing paid higher wages compared to agriculture, aggregate income increased in the region for an extended time. Overall, although they caution against generalizing these benefits, researchers find a positive rate of return for TVA investments.[126]

Today, the Tennessee Valley Authority continues to operate one of the nation's largest electric power systems, primarily raising revenues through sales to 155 local power companies. On the economic development front, the TVA continues to collaborate with economic development agencies at all levels of government to attract new investments and companies. According to the Tennessee Valley Authority, these coordinated efforts attracted over $8.9 billion in investments and retained or created over 66,500 jobs in Fiscal Year 2019.[127]

In attracting said businesses and investments, the agency delivers reliable, affordable electricity and the region's connectivity.[128] But a more significant part of what has made the organization successful in attracting investments is a comprehensive suite of services to meet business needs. These include a site readiness initiative and site selection assistance, investment credits and loan funds, resources for customized workforce training, and engineering and design services. The TVA also continues to develop local talent through workforce training and community development programs, including leadership initiatives, specialized workforce training, and apprenticeship programs.[129]

STATE SOLUTION 3: MITIGATE PROJECT RISK BY STREAMLINING REVIEW PROCESS AND OFFERING PREDEVELOPMENT SUPPORT

State governments can also play a role in the prioritization of resilient infrastructure projects by facilitating access to capital. Given that these projects are often seen as higher risk, states should offer expedited environmental and procedural review processes for infrastructure projects demonstrating clear climate benefits. Legislating an expedited environmental process for climate-resilient projects will lower infrastructure costs by providing greater project certainty. In California, for instance, legislators have accelerated the review process for sports stadiums and reduced project costs[130] but have not done so in a broad manner for resilient infrastructure projects.[131]

States should also offer predevelopment support of 10-15 percent of project costs to infrastructure projects with a clear environmental benefit and linked to performance measures. By providing crucial predevelopment dollars, states give private partners greater certainty in infrastructure development. In Denver, for instance, the Regional Transportation District (RTD) sought a private-partner relationship to build 122 miles of commuter and light rail lines and 18 miles of bus rapid transit. In the procurement process, the RTD offered stipends of $2.5 million to a non-selected team and $20 million to the selected group in case of project termination. These dollars ensured that proposal costs did not prevent participation.[132]

In line with state solutions two and three, states could also register a pool of bundled infrastructure projects—granted streamlined approval—on an exchange to attract institutional investment. Expedited projects could also be packaged at the regional level and registered on an exchange to attract additional private-sector funding.

NEXT STEPS

FOR STATE GOVERNMENTS

- **Define clear environmental standards for infrastructure projects that align with federal environmental standards.**
- **Aggregate existing state and local incentives and integrate into a new incentive package for qualifying climate-resilient infrastructure projects:**
  - **Delineate environmental standards into tiers, with projects demonstrating better climate-resilient outcomes qualifying for more robust incentive package support (e.g., increased predevelopment support or expedited review).**
- **Set guidelines for expedited review and evaluation of bundled projects.**

LOCAL SOLUTION 1: ADOPT A LAND VALUE CAPTURE FRAMEWORK TO GENERATE SUSTAINABLE REVENUES

When public agencies build new infrastructure or invest in the built environment—whether building projects or changing zoning—these improvements often lead to increased accessibility and productivity. These benefits capitalize as improved land and property values for nearby parcels.[133] Research has demonstrated, for instance, that light rail access has a positive impact on nearby residential property values.[134] Insofar as private actors hold these properties, public investment gains will accrue to private owners.

From a fairness and efficiency perspective, the taxpayers and communities who have paid for said improvements should receive and share their financial and social benefits. Land value capture (LVC) is a set of financing and development tools to transform the increased private property values resulting from investments in the built environment into public revenues. Local agencies can then use these revenues to finance the infrastructure project or to pay for future projects.

Depending on the nature of the land capture mechanism, revenues can also pay for the ongoing costs and maintenance of infrastructure investments. By strategically incorporating land value capture tools into their financial toolkits, local agencies can create sustainable sources that do not depend on federal and state coffers. To do so, however, local agencies must understand and assess the infrastructure developments or **changes in the built environment** that will bring new value, the **land** benefitting from improvements, the **goals** of LVC, and the **mechanism** for capturing value.

Changes in the Built Environment

The premise of value capture rests on changes in the built environment. Successfully implementing LVC requires local governments to evaluate planned and expected infrastructural developments, whether that means creating new subway lines, providing bus rapid transit in a critical corridor, building new water infrastructure, or upzoning (changing land uses to allow for taller and denser buildings and housing). Cities and public agencies lacking general plans (for instance, transportation or land use plans) will need to define medium- and long-term strategies to maximize the value of these investments.

Land

To understand the impact of new infrastructural development, local agencies must also have accurate estimates of land values. For publicly owned property, this means establishing a transparent, publicly accessible, and up-to-date database of parcels, complete with the location, value, size, current land use, whether or not it is vacant or underutilized, and its intersection with any upcoming infrastructure projects or developments. Local agencies should also take stock of privately owned

land values within their jurisdiction in a publicly accessible database and create an inventory of those properties within a certain radius of scheduled infrastructure improvements.

Goals and Capture Mechanism

Different tools suit different occasions. To build more affordable housing, for instance, a municipality could combine undeveloped, adjacent parcels into a single portfolio. After doing so, the agency could sell development rights in exchange for affordable units. In removing the cost of land, overall development costs decrease, making affordable housing more financially feasible.

On the other hand, if raising public transportation revenues is the goal, local transit agencies could develop land owned near rail or bus rapid transit lines and lease the properties to generate consistent revenues. In the case of the Hong Kong Mass Transit Railway (HKMTR), the public-private entity is entitled to purchase, develop, and lease land near rail lines. The HKMTR raises almost two-thirds of its revenues from developing and renting property.[135]

Similarly, tax or fee-based mechanisms—for instance, land taxes and development impact fees—are most appropriate when transparently applied, when coordinated with other local and state agencies, and when aligned with the current tax structure. To some degree, annual property taxes, the largest source of local revenues, already capture some proportion of rising land values. Taxpayers may also interpret impact and linkage fees as additional property taxes rather than as separate charges, which can disincentivize participation.[136]

In California, for instance, development impact fees are providing crucial funding for infrastructure but drive up the costs of an already high-tax climate. Research suggests that these higher costs are due to a lack of transparency in defining fee structures.[137] If municipalities decide on impact or development fees to fund infrastructure, the link between charges and costs and their relationship to the overall local tax context must be clear.

Given the geographic impact of developing new infrastructure, is it more equitable for adjacent landowners and users to bear the cost, or should the state and federal government share the costs? To implement value capture successfully, local agencies must understand their goals and their legal, geographic, and fiscal context before identifying a specific tool (see the case study for more details on land value capture mechanisms). By using strategically targeted, well-coordinated land value capture strategies, local agencies can maximize tight federal and state funding and generate sustainable, continuous revenues for infrastructure development.

NEXT STEPS

FOR LOCAL GOVERNMENTS

- **Form an internal task force or committee to measure asset holdings and study land value capture implementation and strategies in line with state law.**
- **Identify and inventory:**
  - **planned-for or upcoming changes in the built environment,**
  - **all publicly owned land (square footage, current use, current value), and**
  - **privately owned land within a certain radius of forthcoming improvements.**
- **Define the return-on-investment goals of land value capture portfolio and project pipeline priorities (e.g., housing development, business formation, and energy generation).**
- **Identify specific and appropriate value capture tools given context, current development climate, and goals.**

Case Study: Implementing Land Value Capture[138]

Key Takeaway: There are a variety of options for generating sustainable revenues through land value capture. The right tool depends on the legal, social, and economic context of each project. By tailoring their value capture approach, local agencies can maximize public returns on investment.

Tax-Based Tools
These instruments, based on underlying property taxes, levy an additional charge on households, landowners, or businesses that benefit from new infrastructure investments. Tax-based tools commonly include tax increment financing (TIF) districts, which promise a percentage of future tax revenue growth to pay for current investments in the built environment.

EXAMPLE: *Denver needed to restore and redevelop its historic downtown transportation hub, Union Station, at the cost of $500 million. In 2008, the Denver City Council created the Denver Union Station Project Authority (DUSPA), a nonprofit, government-owned corporation to manage and issue debt for the project. The City Council also approved a 30-year TIF district, including 20 acres surrounding Union Station.[139] The project is using a forecasted $640 million in incremental sales and property tax revenues to retire bond obligations and pay debt service on two federal loans.[140]*

Fee-Based Tools
Fee-based value capture mechanisms use a one-time charge on beneficiaries of infrastructure investments to pay for them.[141] These include:

- *Impact or linkage fees:* One-time charges on developers are tied to the cost of infrastructure services.
- *Special Assessment Districts:* Select property owners pay fees to pay for infrastructure investments they will benefit from.
- *Exactions:* Developers pay municipalities to obtain approval or permission to build on a parcel.
- *Transportation utility fees:* Residents and businesses pay charges based on transportation system usage.

EXAMPLE: In 1992, the Los Angeles County Metropolitan Authority created two special assessment districts to finance the construction of the Red Line, a new subway route.[142] These districts, formed around future stations, included 1,500 properties and a total area of 67 million square feet. At an average fee of 25 cents per square foot, the districts generated roughly $20 million in revenues per year (as of 2005).[143]

Development-Based Tools
Development-based value capture mechanisms use publicly owned land to finance infrastructure investments. These include:

- Development rights: Developers pay the municipality a fee for additional development rights, like increased density or zoning changes, which fund infrastructure.
- Joint development: This tool entails the development of infrastructure and adjacent private real estate development. The private-sector partner either provides the building or makes a financial contribution to the development project.[144]

EXAMPLE: In 1994, the Miami-Dade County transit agency entered into a joint development project with the Berkowitz Development Group to develop a 350,000 square-foot shopping center on a parcel next to the Dadeland North Metrorail Station.[145] The agreement is for a 90-year lease, set to expire in 2084, under which the transit agency receives $400,000 or 5 percent of gross revenues annually from commercial developments adjacent to the metro station.[146]

VI.

CONCLUSION

Civic leaders must not wait for congressional action or renewed federal funding measures to address infrastructure development needs. Instead, local leaders should act swiftly to establish governance frameworks that support investment strategies using innovative finance tools. Local and state leaders must look beyond the traditional reliance on commercial development, sales tax, and gas tax revenues, and focus on leveraging public funds to generate new investment opportunities. Moreover, infrastructure investment must evolve to meet the needs of the current moment, which requires cutting across silos. As in the case of the Denver Eagle P3, infrastructure projects will necessarily span a range of collaboration and financing methods, including public-private partnerships, land value capture, and federal financing. But ultimately, by broadening the scope of public infrastructure investment, leaders can offer residents more choices on where to live, work, and enjoy their communities.

Next Steps: Accelerating the Land Value Capture Framework for State and Local Governments

By identifying lingering local deficiencies in infrastructure investment—including housing, broadband, business formation, renewable energy generation, and mobility—local government leaders can craft inclusive development strategies that promote community thriving and sustained growth. From the perspective of state and local authorities and operators, embracing a land value capture recommendation outlined in this report would involve mobilizing the following steps:

(1) Assess local assets and define the opportunity for development: The establishment of a facilities commission or investment authority would allow for an inventory of public assets and development alignment with existing projects and land available to further coordinate, streamline, and accelerate

regional economic development needs (e.g., housing, business formation, renewable energy generation, broadband).

(2) Leverage innovative finance to fund community reinvestment: Establish a local/state impact fund that would leverage state and federal credit enhancements tools (e.g., remediation, predevelopment, land acquisition) and tax incentives (e.g., new markets, Opportunity Zones). A fund would add certainty to a regional shovel-ready project portfolio and incentivize outside investment.

(3) Prioritize additional revenue sources to meet local investment deficiencies in the built environment and human capital needs: Seek enhanced public-private partnership authority to coordinate with developers in a broader array of infrastructure classes in the newly formed regional project portfolio.[147]

The effects of our chronic disinvestment in the built environment are clear. Decreased federal spending means we are now spending more just to maintain and operate our decades-old infrastructure. Meanwhile, local agencies have an increased fiscal burden simply to operate and maintain core assets, while these are increasingly reaching the end of their useful life. In small and large ways, this has ramifications for millions of Americans—whether by way of longer commutes, water quality issues, or a lack of social and economic connectivity. A more prosperous, equitable American future hinges on identifying the necessary political will—federal, state, and local—to support a new infrastructure investment framework.

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ABOUT THE AUTHORS

Matt Horton is a director at the Milken Institute's Center for Regional Economics and California Center. In this capacity, he interacts with government officials, business leaders, and other key stakeholders in directing statewide programming and policy initiatives. Horton's programmatic work identifies a variety of financial tools, public policies, and collaborative models that leaders can deploy to increase investments in education, community development, housing, human capital, and place-based economic development. Previously, Horton worked for the Southern California Association of Governments, the nation's largest metropolitan planning organization. There, Horton served as the primary point of contact for external and government affairs, coordinating regional policy development with elected officials as well as sub-regional, state, and federal stakeholders. In this role, he developed plans with leaders across Southern California to address growth, build resiliency, and improve quality of life.

Misael Galdamez is a senior policy analyst at the Milken Institute's Center for Regional Economics. He focuses on regional economic issues—specifically, the role of innovation, workforce, and housing policy in supporting growth and opportunity. Galdamez recently completed a master's degree in city planning at MIT's Department of Urban Studies and Planning, where his work centered on inclusive and equitable economic development. His thesis research developed an adapted methodology for living wage estimations in Mexico City. Before graduate school, Galdamez was a division and project coordinator at the International Monetary Fund, where he worked on several research projects related to remittances and migration in and from Latin America.

Ivana Wang is a policy analyst at the Milken Institute's Center for Regional Economics. Her research work focuses on place-based investment, economic development strategies, and workforce development. Prior to the Milken Institute, Wang worked as a research associate at the University of Southern California (USC) Center for Economic Development, where she analyzed regional challenges and strategies to sustain advanced manufacturing in Southern California. She holds a Master in Public Administration from the USC, where her graduate research included developing national policies on school violence prevention, as well as incentivizing resilient infrastructure technology adoption. Her research interests span a variety of topics connected by systems improvement through program design, evaluation, and behavioral insight. Wang holds a bachelor's degree in psychology from Pepperdine University, where she specialized in experimental and industrial-organizational applications.

Charlotte Kesteven is a senior policy analyst at the Center for Regional Economics at the Milken Institute. Her research centers on regional economic development, infrastructure, and workforce. Before joining the Milken Institute, Kesteven worked as an economist at the Victorian Government Department of Treasury and Finance in Melbourne, Australia, where she advised the treasurer and other officials on education policy and workforce development issues. Kesteven has also worked as a consultant, researching economic development, infrastructure, urban planning, and demographic forecasting for local, state, and federal government clients in Australia and New Zealand. Kesteven received her master of economics from the University of New England (Australia) in 2015, where her research focused on the economic impacts of deregulation, particularly concerning transportation industries. She also holds a bachelor of international business from the Australian National University, majoring in international business and Spanish.

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